PB82-154212

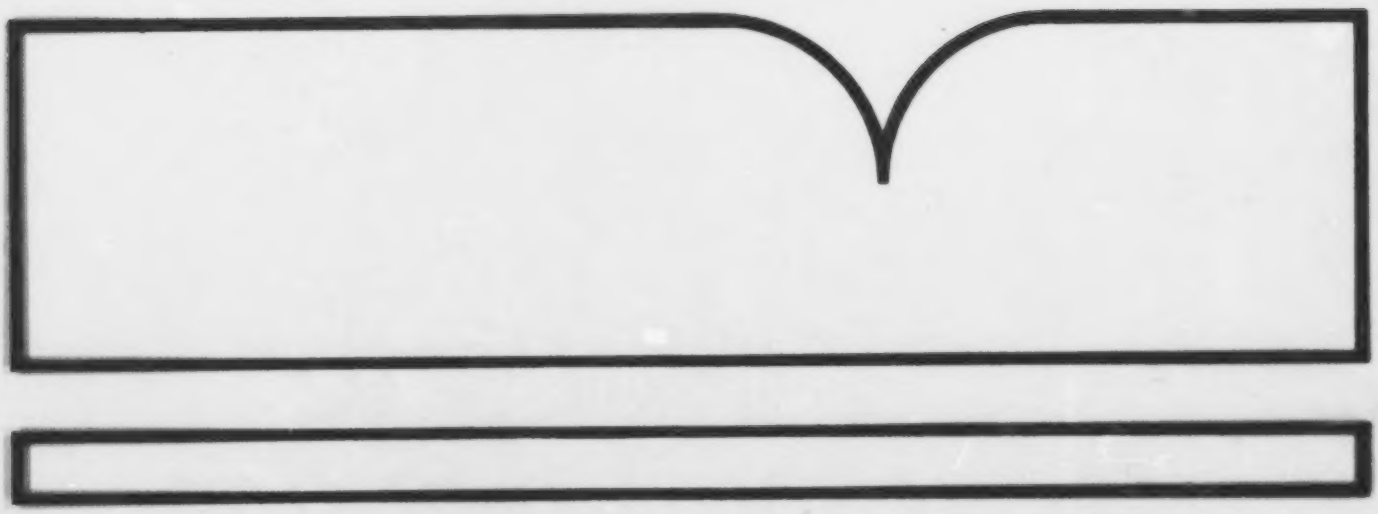
East/Central Contra Costa County Wastewater Management Plan

Arthur D. Little, Inc.
San Francisco, CA

Prepared for

Environmental Protection Agency
San Francisco, CA

Apr 76



U.S. Department of Commerce
National Technical Information Service
NTIS.

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15. Supplementary Notes

Prepared with Thomas Reid Associates

16. Abstract (Limit: 200 words) The purpose of the East/Central C.C.C. W. M. Plan is to provide adequate treatment and disposal for sewage from a present day population of 90,,000 persons in Contra Costa County, CA including the Cities of Antioch, Brentwood and Pittsburg. The locality studied includes extensive residential, agricultural, industrial and recreational areas bounded on the north by the Sacramento and the San Joaquin Rivers. The River system is subject to important beneficial uses including fish and wildlife habitat, recreation and freshwater withdrawal for irrigation, domestic supply and industrial use. The proposed project provides for an 85% increase in population by the year 2000 and entails; Conveyance of sewage from Shore Acres, Pittsburg and Antioch to a sub-regional treatment facility located to the east of Pittsburg; Local secondary treatment and land disposal by evaporation/percolation at Brentwood, Byron, Discovery Bay and Oakley(including Bethel Island); and local secondary treatment, disinfection, dechlorination and discharge to the surface waters of the Sacramento at Mountain View (via marsh enhancement) and at Port Costa.

17. Document Analysis a. Descriptors

Sewage treatment
Sewage Disposal
Sewerage
Regional Planning
Environmental effects

b. Identifiers/Open-Ended Terms

Secondary Effects
Contra Costa County, CA
Environmental Impact Statement

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
	20. Security Class (This Page)	22. Price

(See ANSI-Z39.18) See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

PB82-154212

EAST / CENTRAL CONTRA COSTA COUNTY WASTEWATER MANAGEMENT PLAN

Environmental Impact Report & Statement Draft

SUMMARY

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

UNITED STATES · ENVIRONMENTAL PROTECTION AGENCY ·

April 1976

EAST/CENTRAL CONTRA COSTA COUNTY WASTEWATER MANAGEMENT PLAN

DRAFT APRIL 1976

ENVIRONMENTAL IMPACT REPORT/STATEMENT

Published By:

U.S. Environmental Protection Agency
100 California Street
San Francisco, California 94111

East/Central Contra Costa County
Wastewater Management Agency
County Administration Building
Martinez, California 94553

Responsible Officials:

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Regional Administrator
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Craig Z. Randall
President

Prepared By:

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READER'S GUIDE

The Draft EIR/EIS for the East/Central Contra Costa County Wastewater Management Program is divided into introductory material and two major parts

The Introductory begins with a Preface which shows the location of the project, briefly describes the purpose of the project, the application of Federal and State requirements for environmental documentation, the public review process and the parties involved in developing the Wastewater Management Plan. Next appears an Executive Summary, a brief presentation of the salient points ot environmental concern in this case, followed by a list of those institutions or individuals receiving copies of the Draft document, and by the Table of Contents.

Part I of the report itself contains the project description, discussing the wastewater problem, the solution selected by the East/Central Agency for preliminary consideration, and the costs of that solution. This is followed by a discussion of the viable project alternatives reviewed by the Agency just prior to initial project selection. These do not represent the full range of alternatives considered, which are described in Part II, Section 7. Part I continues with a summary of the environmental impact of the project, both direct impacts resulting from project facilities and indirect resulting from population growth accommodated by the project. The final section in Part I presents a list of unavoidable adverse impacts, possible mitigating measures, and a discussion of general environmental issues. Part I contains the major substantive elements of the EIR/EIS. It is published and distributed separately from Part II as a short version or summary of the EIR/EIS.

Part II, included only in the full copies of the EIR/EIS, presents a detailed description of existing conditions, project impact, alternatives to the proposed project, and references to the report. Although Part II is not necessary for a general understanding of the project's environmental impact, it is not merely an appendix - Part II contains background information, substantiation for conclusions and discussion of many minor points which are not included within Part I.

INTRODUCTORY

PREFACE
EXECUTIVE SUMMARY
DISTRIBUTION LIST
TABLE OF CONTENTS

PART I

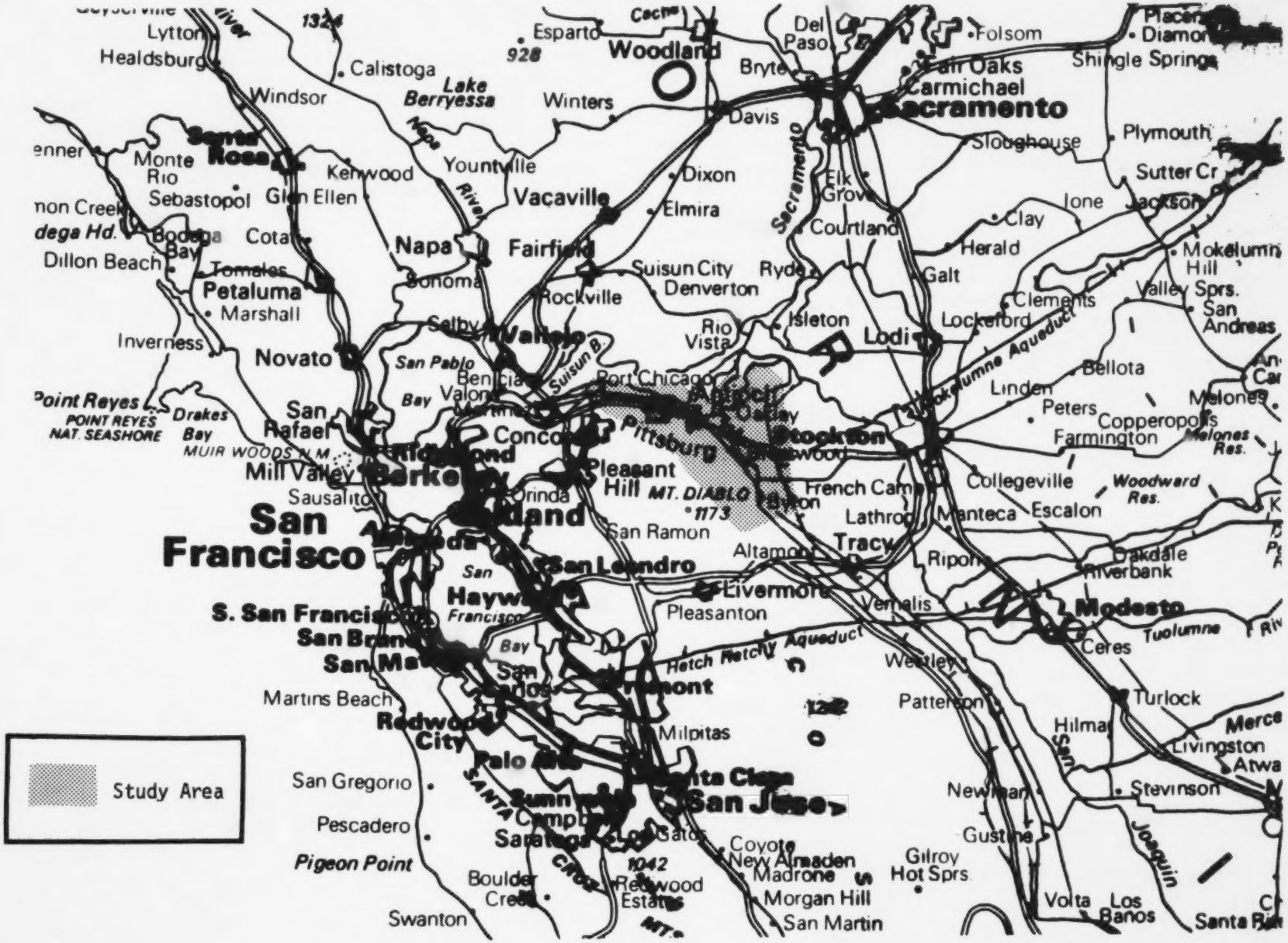
1. DESCRIPTION
2. COMPARISON OF VIABLE ALTERNATIVES
3. ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION
4. SUMMARY OF UNAVOIDABLE ADVERSE IMPACTS
   MITIGATING MEASURES

PART II

5. PRESENT CONDITIONS AND
   ENVIRONMENTAL SETTING WITHOUT PROJECT
6. FUTURE CONDITIONS AND PROJECT IMPACT
7. ALTERNATIVES TO THE PROPOSED ACTION
8. REFERENCE

PROJECT LOCATION

EAST/CENTRAL CONTRA COSTA COUNTY STUDY AREA



PREFACE

The East/Central Contra Costa County Wastewater Management Program is a comprehensive review of wastewater service for some 90,000 persons in Contra Costa County, California. In order to adequately treat the area's municipal wastewater and protect the quality of receiving waters from undesirable levels of pollutant discharge, the Management Program entails improvement to sewage plants within the Agency jurisdiction. Project construction, subregional consolidation, expanded population service and considerations of water quality place the proposed project under the purview of the California Environmental Quality Act (CEQA - 1970) which requires the preparation of an environmental impact report (EIR) as an informational document to support decisions concerning this project. In addition, the Wastewater Management Program is eligible for federal assistance under the Clean Water Act (1972), and since it involves federal monies, the proposed project also falls under the purview of the National Environmental Policy Act (NEPA - 1969), and thus requires the preparation of an environmental impact statement (EIS). Since the spirit of both CEQA and NEPA is the same in their protection of environmental quality through discovery and disclosure and since the content of an EIR and EIS is nearly identical, this report is intended to serve both requirements for environmental documentation.

The purpose of an EIS is twofold. In the first place, the environmental assessment is intended to inform and guide the project initiator in his choice of project alternatives concerning the size, nature and location of facilities. In the second place, the EIS makes a formal presentation of the environmental analysis used by the decision making group, thereby allowing other parties to participate in the decision making process.

The Draft EIR/EIS is made public, with distribution to Federal, State and local agencies and to firms, organizations and individuals who have interest in the matters involved. After at least 45 days the East/Central Agency must hold a public hearing on the EIR under the California Environmental Quality Act to receive verbal and written comment on any aspect of the project's environmental effects. The U.S. Environmental Protection Agency must also hold a public hearing to solicit comment which may be held concurrently with the EIR hearing.

The comment received during the public review process becomes the subject of a second environmental document which responds to issues raised during review, and which serves as an addendum to the Draft EIR/EIS to constitute the Final EIR/EIS. Upon acceptance and adoption of the Final EIR/EIS, the Agency makes the ultimate decision concerning the project.

The Wastewater Management Program was developed through the coordinated efforts of four parties. The local Agency, the East/Central County Agency, comprises representatives of all of the service agencies involved. The agency assisted the development of the program both through a series of monthly public meetings and through the representation of the Technical Advisory Committee (TAC). The second party is the group of representatives of regulatory agencies concerned with environmental quality in the San Francisco Bay region. These include the US Environmental Protection Agency (EPA), the State Water Quality Control Board, the San Francisco Bay and Central Valley Regional Water Quality Control Boards, the Association of Bay Area Governments, the Bay Area Sewer Services Agency and others. The third party was the Project Design Team comprising the engineering firm CDM/KKA, a joint venture between CDM, Inc. and Koretsky King Associates,in association with SRI, Inc. The fourth party, Arthur D. Little, Inc. in association with Thomas Reid Associates, conducted the environmental analysis of the program and prepared the EIR/EIS.

EXECUTIVE SUMMARY

ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT

EAST/CENTRAL CONTRA COSTA COUNTY WASTEWATER MANAGEMENT PLAN

DRAFT (X)
FINAL ( )

Prepared by: U.S. Environmental Protection Agency
Pacific Southwest Region IX
100 California Street
San Francisco, California 94111

East/Central Contra Costa County
Wastewater Management Agency
County Administration Building
Martinez, California 94553

1. Type of Action:

Administrative, under the authority of Public Law 92-500, Section 201.

2. Description of Project:

The purpose of the East/Central Contra Costa County Wastewater Management Plan is to provide adequate treatment and disposal for sewage from a present day population of 90,000 persons in Contra Costa County, California including the Cities of Antioch, Brentwood and Pittsburg. The locality studied includes extensive residential, agricultural, industrial and recreational areas bounded on the north by the Sacramento and San Joaquin Rivers. The River system is subject to important beneficial uses including fish and wildlife habitat, recreation and freshwater withdrawal for irrigation, domestic supply and industrial use.

In order to protect and enhance these uses, and in order to meet the requirements of regulatory agencies, the East/Central County Agency was formed as a Joint Powers Authority comprising twelve member entities presently administering eleven sewage treatment facilities. As a result of engineering, economic and environmental study, the East/Central County Agency selected the proposed project. The proposed project provides for an 85% increase in population by the year 2000 and entails:

- Conveyance of sewage from Shore Acres, Pittsburg and Antioch to a sub-regional treatment facility located to the east of Pittsburg. The sub-regional facility will provide secondary level treatment with disinfection, dechlorination and discharge to the surface waters of the Sacramento at New York Slough;
- Local secondary treatment and land disposal by evaporation/percolation at Brentwood, Byron, Discovery Bay and Oakley (including Bethel Island); and
- Local secondary treatment, disinfection, dechlorination and discharge to the surface waters of the Sacramento at Mountain View (via marsh enhancement) and at Port Costa.

3. Impacts of Project:

Direct impacts of project construction include consumption of raw materials, temporary noise, dust, and traffic disruption, and disturbance of small areas of upland, wetland and mudflat habitat. Outfall construction will result in short-term water quality impacts. The pipeline route usually follows existing rights-of-way and plants are sited near existing facilities in order to minimize direct impacts. Total first stage cost will be $40.5 million (1976) of which the local share will be $9.7 million.

Direct impacts of project operation will be continuing consumption of energy and materials and continuing discharge of treated effluent. By the year 2000, fourteen million gallons per day (MGD) will be discharged to the surface waters of the Sacramento River System. Effluent will contain moderate amounts of heavy metals or other toxic materials. This discharge is within the assimilative capacity of the river and is not expected to have unacceptable acute or chronic impacts on aquatic life or beneficial uses of the water. Land disposal will involve 2.3 mgd in four locations, resulting in increased mineral content in surface aquifers not presently suitable for major domestic water supply. Operations and maintenance will cost approximately $0.9 million per year (1976) resulting in a combined annual local cost of $1.8 million.

Indirect impacts will result from project growth accommodation. The projected 85% increase in Study Area population used as a design criteria for the project will mean a proportionate increase in energy consumption, in agriculture or open space, and use conversion to residence, in vehicular travel and air emissions. The Study Area presently has an internally oriented balanced economy with per capita vehicular travel slightly greater than the Bay Area average. This situation is expected to continue over the project life time, resulting in only moderate indirect impact from this project relative to other rapidly growing portions of the Bay Area.

4. Alternatives:

In addition to the no-project alternative, thirty-two system configuration alternatives were considered. These range from completely local treatment to full regionalization. Six points of surface water discharge and several methods of land disposal were considered, as well as the potential for reclamation and reuse of treated wastewater. Phased capacity expansion is a part of the adopted project.

5. Dates Available to CEQ and the Public:

Draft:

Final:

6. Distribution List Attached.

DISTRIBUTION LIST

FEDERAL AGENCIES

U.S. Environmental Protection Agency 2
Office of Legislation A-103
Congressional Affairs Division
Washington, D.C. 20460

US Environmental Protection Agency 2
Office of Federal Activities A-104
Washington DC 20460

US Environmental Protection Agency 2
Office of Public Affairs A-107
Washington DC 20460

US Environmental Protection Agency 2
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100 California Street
San Francisco CA 94111

Freedom of Information Center
EPA, Room 329 2
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Bureau of Indian Affairs
Bureau of Reclamation
Bureau of Outdoor Recreation
US Fish & Wildlife Service
US Geological Survey
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All institutions received full copies of report including the Summary (Part 1) unless denoted by asterisk which indicates having only received the Summary.

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Pittsburg CA 94565

Shell Oil Company *
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Martinez CA 94553

US Steel Corporation *
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Pittsburg CA 94565

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NEWS MEDIA

San Francisco Chronicle *
5th and Mission Streets
San Francisco CA 94103

SF Bay Guardian *
1970 Bryant Street
San Francisco CA 94110

San Francisco Examiner *
110 Fifth Street
San Francisco CA 94103

Oakland Tribune *
13th and Franklin Streets
Oakland CA

Antioch Daily Ledge *
514 4th Street
Antioch CA 94509

Pittsburg Press *
655 Railroad Avenue
Pittsburg CA 94565

Contra Costa Time *
1940 Mt. Diablo Blvd.
Walnut Creek CA 94596

Pittsburg Post Dispatch *
515 Railroad Avenue
Pittsburg CA 94565

Brentwood News *
PO Box 517
Brentwood CA 94513

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PO Box 471
Martinez CA 94553

KRON - TV *
1001 Van Ness Avenue
San Francisco CA 94119

KQED - TV *
1011 Bryant Street
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KPIX - TV *
2655 Van Ness Avenue
San Francisco CA 94109

KGO - TV *
277 Golden Gate Avenue
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KPFA Radio Station *
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LIBRARIES

Contra Costa County Library
(Central Library) 2
1750 Oak Park Blvd
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Contra Costa County Library
(Pittsburg Branch) 2
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Contra Costa County Library
(Antioch Branch) 2
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Antioch CA 94509

Contra Costa County Library
(Brentwood Branch) 2
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(Byron Branch) 2
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TABLE OF CONTENTS

PART ONE (This material also published separately as the Summary)

PROJECT DESCRIPTION 1

LOCATION 1-1

WATER QUALITY PROBLEMS AND OBJECTIVES 1-3
Treatment Requirements 1-4
Existing Wastewater Service 1-5

GRANT APPLICANT DESCRIPTION 1-6

PROPOSED PROJECT 1-6
Design Population 1-7
Facilities - Design Treatment 1-8
Reclamation and Reuse 1-11
Sludge Disposal 1-11
Project Cost 1-11
Status of Approval of Apparent Best Alternative 1-14

COMPARISON OF VIABLE ALTERNATIVES 2

ALTERNATIVE WASTEWATER MANAGEMENT CONCEPTS 2-1
Regionalization 2-1
Surface Water Discharge 2-2
Land Disposal 2-2
Reclamation/Reuse 2-3
Sludge Disposal 2-4

VIABLE PROJECT ALTERNATIVES 2-6
Summary Evaluation of Alternatives 2-6
Basis for Selection of Proposed Project 2-9

ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION 3

DIRECT IMPACTS -- CONSTRUCTION AND OPERATION 3-1
Water Quality 3-1
Aquatic Ecology 3-2
Terrestrial Ecology 3-3
Cultural Resources 3-3
Aesthetics 3-3
Financing 3-4
Sensitive areas and Flood hazards 3-4

INDIRECT IMPACTS -- GROWTH ACCOMMODATION 3-5
Growth Inducing Impact Of The Proposed Action 3-5
Land Use 3-8
Growth in Environmentally Sensitive Areas 3-9
Demography 3-10
Economics 3-11
Transportation 3-12
Air Quality 3-13
Energy 3-14

SUMMARY OF UNAVOIDABLE ADVERSE IMPACTS/MITIGATING MEASURES 4

TABLE OF IMPACTS 4-1
MITIGATION MEASURES 4-7
ENVIRONMENTAL ISSUES 4-11
Relation Between Local Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity 4-11
Irreversible and Irretrievable Commitments of Resources To the Proposed Action Should It Be Implemented 4-13

PART TWO (This material does not appear in the Summary)

PRESENT CONDITIONS AND ENVIRONMENTAL SETTING WITHOUT PROJECT 5

WATER QUALITY - PRESENT 5-1

LEGAL REQUIREMENTS FOR WATER QUALITY IMPROVEMENT 5-1
Policy 5-1
Law 5-1
Implementation 5-3

SUMMARY OF EXISTING CONDITIONS 5-5
Tidal Action and River Flow 5-7
Seasonal Variations 5-8
Man-Made Changes in Flow Regimes 5-8
Beneficial Uses of River System 5-9
Pollution 5-10
Agricultural Wastewater 5-10
Industrial Discharge 5-10
Municipal Wastewater 5-10
Quality of Receiving Waters 5-13
Assimilative Capacity 5-13
Critical Water Quality Parameters 5-16
Dissolved Oxygen 5-16
Biostimulants 5-16
Toxicity 5-16
Coliform Bacteria 5-17
Ground Water Supply in the East County 5-18

GEOLOGY AND SOILS - PRESENT 5-20

Major Geologic Units 5-20

SOILS 5-23
Agricultural Plain 5-23
Bethel Island 5-25
Foothills 5-25

SENSITIVE AREAS - PRESENT 5-26

ECOLOGY - PRESENT 5-26

Outfall Site 5-27

CULTURAL RESOURCES - PRESENT 5-30

LAND USE, DEMOGRAPHY AND ECONOMICS - PRESENT 5-31

General 5-31

DEMOGRAPHY - PRESENT 5-37
Population Size 5-37
Age Structure 5-40
Population Fertility 5-42
Persons Per Household 5-44
Racial Composition 5-45
Income Distribution 5-46
Port Costa and Mountain View 5-49

EMPLOYMENT - PRESENT 5-51
Class of Workers 5-51
Employment - Industrial and Commercial 5-53
Land Use - Commercial 5-53

RESIDENCE - PRESENT 5-54
Mobility 5-54
Tenure 5-56
Year Structure Built 5-58
Annual Percentage Growth Rate in Housing 5-59
Value of Owner-Occupied Units 5-62
Value of Rental Units 5-64
Change in Housing Value Since 1970 5-66
1975 Land and Housing Values Within Study Area 5-67

AGRICULTURE - PRESENT 5-69
Crop Acreage and Values 5-69
Crop Payment Capacity Analysis 5-72

COMMUNITY FACILITIES - PRESENT 5-75
Schools 5-75
Water Supply 5-75
Flood Control 5-82
Solid Waste Disposal 5-82
Police Protection 5-82
Fire Protection 5-83

TRANSPORTATION - PRESENT 5-84

Traffic Characterization 5-84
Trip Destinations 5-84
Means of Transportation to Work 5-85
Automobiles Available 5-85
Place of Employment 5-87
Vehicle Miles Traveled 5-92
Mountain View and Port Costa 5-97

AIR QUALITY - PRESENT 5-98

Legal Requirements for Air Quality Improvement 5-98
Public Regulatory Agencies and Governmental Policy 5-98
Air Quality Control Strategies 5-99
Federal and State Air Quality Standards 5-101
Local Air Quality 5-103
Climate and Topography 5-104
Photochemical Oxidant 5-104
Pittsburg/Antioch Plain 5-104
Agricultural Plain and Delta Lowlands 5-105
Foothills 5-107
Mountain View 5-108
Port Costa 5-108
Nitrogen Oxides 5-108
Sulfur Dioxide 5-108
Carbon Monoxide 5-109
Suspended Particulates 5-109

ENERGY - PRESENT 5-111

Principles 5-111
Port Costa and Mountain View 5-113

FUTURE CONDITIONS AND PROJECT IMPACT 6

WATER QUALITY - IMPACT 6-1

Local Impacts 6-1
Regional Impacts - General Discussion and Conclusion 6-8
Discharge Impact Simulation 6-20
Tests and Results 6-21
Port Costa and Mountain View 6-33
Mitigation Measures 6-34
Land Disposal Impacts 6-35
Soils and Groundwater Impacts 6-35
Water Supply Impact: Surface Water Intakes 6-38

GEOLOGY AND SOILS - IMPACT 6-41

ECOLOGY - IMPACT 6-42

Direct Impacts 6-42
Effects of Dredging 6-42
Water Quality Effect on Wetlands 6-44

CULTURAL RESOURCES - IMPACT 6-46

LAND USE, DEMOGRAPHY AND ECONOMICS IMPACT 6-48

DESIGN LAND USE DISTRIBUTION (DLUD) 6-48
Industrial Shore 6-49
East County Planning Area 6-51
Agricultural Plain 6-51
Delta Lowlands 6-52
Foothills 6-52
Mountain View Service Area 6-52
Port Costa Service Area 6-52

REGULATION AND AUTHORITY 6-53
Local Plans and Zoning 6-53
State Law, Legislation and Planning 6-54

DEMOGRAPHY - IMPACT 6-56
Income Level 6-57

EMPLOYMENT - IMPACT 6-58
Regional Agency Projections 6-58
Impact of Place and Type of Employment 6-61
Economic Impacts of Project Accommodated Growth 6-64
Industrial 6-64
Commercial 6-64

AGRICULTURE - IMPACT 6-67
Land Conversion by Urbanization 6-67
Competition for Land by Agriculture 6-67
Incompatibility of Agriculture and Residential Development 6-68
Planning and Public Policy 6-70

COMMUNITY FACILITIES - IMPACT 6-75
Schools 6-75
Flood Control 6-77
Solid Waste 6-78
Police Service 6-78
Fire Protection 6-79
Roads 6-79

THE ECONOMIC IMPACT OF PROJECT CONSTRUCTION 6-81
Project Financing 6-81
Federal and State Capital Financing 6-81
Local Share of the Project Capital Cost 6-82
Local Share Financing 6-82
Capital Costs 6-82
Ad Valorem property taxes 6-83
Service charges 6-83
Connection charges 6-83
Standby charges 6-83
Annexation Fees 6-84
Special Financing Constraints 6-84

TRANSPORTATION AND AIR QUALITY - IMPACT 6-86

Effect of Future Emission Levels on Air Quality 6-89
Mountain View and Port Costa 6-91

ENERGY - IMPACT 6-92

East/Central Study Area 6-92
Port Costa and Mountain View 6-94

SENSITIVE AREAS - IMPACT 6-95

Direct Impact Due to Project Construction 6-95
Indirect Impact Due to Project-accommodated Growth 6-95

ALTERNATIVES TO THE PROPOSED ACTION 7

NON-STRUCTURAL ALTERNATIVES 7-1
No Project-No Action 7-1
Alternative Residential Capacity Allocation/Wastewater Generation Rate 7-7
Lower Wastewater Generation Rate 7-7
Reallocation of Industrial Flow 7-8
Combined Effects 7-8
COMPARISON OF ALTERNATIVES - WATER QUALITY IMPACTS 7-10
Alternative 104 7-10
Alternative 203 & 204 7-11
Alternative 307 & 307W/306E PROPOSED PROJECT 7-11
Alternative 306 & 306W/307E 7-13
Alternative 500A 7-13
Alternative 602 7-14
Alternative 306B 7-15
Alternative 206 7-15

COMPARISON OF ALTERNATIVES - GROUNDWATER IMPACTS 7-16

COMPARISON OF ALTERNATIVES - PIPELINE IMPACTS 7-17

COMPARISON OF ALTERNATIVES - INDIRECT IMPACTS 7-18
Introduction 7-18
Tabular Comparison 7-20

REFERENCES 8

PUBLIC FORUM 8-1

LITERATURE, PERSONS
AND ORGANIZATIONS CONSULTED 8-3
Water Quality 8-3
Geology and Soils 8-5
Ecology 8-5
Cultural Resources 8-5
Land Use, Demography and Economics 8-6
Transportation and Air Quality 8-10
Energy

QUALIFICATIONS OF EIR CONSULTANT 8-12

LIST OF FIGURES

Figure 1-1	Geographic Subareas and Service Areas	1-2
Figure 1-2	Proposed Project	1-9
Figure 5-1	Study Area Regional Setting	5-6
Figure 5-2	Existing Outfall Sites	5-12
Figure 5-2a	Brentwood Wells and Land Disposal Site	5-19
Figure 5-3	Geology	5-21
Figure 5-4	Soils	5-24
Figure 5-5	Historical Sites	5-30
Figure 5-6	Land Use: Agricultural	5-32
Figure 5-7	Land Use: Residential/Commercial	5-33
Figure 5-8	Land Use: Industrial	5-34
Figure 5-9	Land Use: Open Space	5-35
Figure 5-10	Demographic Sub-Areas	5-38
Figure 5-10a	**Study Area Census Tracts**	5-39
Figure 5-11	1970 - 1975 Age Distribution	5-41
Figure 5-11	1970 - 1975 Age Distribution cont.	5-41
Figure 5-13	1970 - 1975 Income Distribution (In 1975 Dollars)	5-47
Figure 5-13	1970 - 1975 Income Distribution (In 1975 Dollars) cont.	5-48
Figure 5-14	Class of Worker - 1970	5-52
Figure 5-15	Residence In 1970 As Compared To 1965	5-55
Figure 5-16	Study Area Tenure - 1975	5-56
Figure 5-17	Year Structure Built 1939 - 1975	5-58
Figure 5-18	Annual Percentage Growth Rate In Housing 1939 - 1975	5-60
Figure 5-19	Value Of Housing - 1970	5-63
Figure 5-20	Rental Units As A Proportion Of All Units	5-64
Figure 5-21	Percent Single Family Homes Renter Occupied - 1970	5-65
Figure 5-22	Housing Value Change 1970 - 1975	5-66
Figure 5-23	Change In Crop Acreage 1960 - 1974	5-69
Figure 5-24	Soils	5-70
Figure 5-25	Change In Crop Value 1960 - 1974	5-71
Figure 5-26	Means Of Transportation To Work 1970	5-86
Figure 5-27	Cars Per Household - 1970	5-87
Figure 5-28	Autos Available Per Dwelling Unit 1970	5-88
Figure 5-29a	Place Of Employment Of Local Residents - 1970	5-89
Figure 5-29b	Place Of Employment Of Local Residents - 1970	5-90
Figure 5-30	Study Area 1975 Work Trips By Length	5-92
Figure 5-31	Centroid Locations For VMT Analysis	5-93
Figure 5-32a	1975 VMT Per Dwelling Unit By Sub-Area	5-94
Figure 5-32b	1975 VMT Per Capita By Sub-Area	5-95
Figure 5-33	Days In Exceedance of Hourly Oxidant Standard	5-104
Figure 5-34	Pittsburg High-Hour Oxidant - 1974	5-105
Figure 5-35	Topography	5-106
Figure 5-36	Days In Exceedance Of State 24 Hour Standard For Suspended Particulates (1971 - 75), Pittsburg Monitoring Station	5-109
Figure 6-1	Maximum Current Experienced By Different Portions Of The Estuary	6-3
Figure 6-2	Comparison Of Relative Amounts Of Water Passing Through Each Portion Of The Estuary	6-4
Figure 6-3	Estuary Cross-section	6-5
Figure 6-4	Duration Of Slack Water In Different Portions Of The Estuary	6-7
Figure 6-5	Existing Water Quality Of San Joaquin R. VS. Sacramento R.	6-8
Figure 6-6	Continuous VS. Ebb Discharge Effects On Concentration Pattern	6-11
Figure 6-7	Background Concentration Pattern	6-22
Figure 6-8	Flood VS. Ebb Tide Concentration Pattern	6-23
Figure 6-9	Steady-State Concentration At Antioch	6-24

Figure 6-10	Tides and System Sum	6-25
Figure 6-11	High VS. Low River Flow Effects On Concentration	6-27
Figure 6-12	Concentration Profile Of Proposed Project and 3 Alternatives	6-28
Figure 6-13	System Sum Of Project and Alternatives	6-29
Figure 6-14	Decay Coefficient Effects On Concentration Pattern	6-30
Figure 6-15	Continuous VS. Ebb Discharge Effects On Concentration Pattern	6-31
Figure 6-16	System Sum Of Continuous VS. Ebb Discharge	6-32
Figure 6-16a	Proposed Outfall and Municipal Water Intake Locations	6-39
Figure 6-17	Camp Stoneman Site Alternatives	6-43
Figure 6-18	Pipeline Routes	6-47
Figure 6-19	Design Land Use Distribution	6-50
Figure 6-20	Estimated Study Area Vehicular Pollutant Load (1971 - 2000)	6-87
Figure 6-21	Estimated Study Area Vehicular Pollutant Load By Sub Air-Basin (1971 - 2000)	6-88
Figure 6-22	Estimated Year 2000 Oxidant Concentration Distributions In The Pittsburg-Antioch Area Relative To 1974 Air Quality	6-90
Figure 6-23	Study Area Sensitive Areas	6-97
Figure 6-24	**Subregional Facility Sensitive Areas**	6-98

LIST OF TABLES

Table 1-2	Existing Waste Discharge Compliance Schedules	1-4
Table 1-3	Comparison Of E-0 and Project Design Population In Sewer Service Areas*	1-7
Table 1-4	Design Populations	1-8
Table 1-9	Estimated 1976 Total Project Cost Of Future Facilities	1-13
Table 1-10	Projected Bond Requirements	1-13
Table 1-11	Annual Debt Service Costs	1-13
Table 2-5	Alternatives and Dispensations	2-6
Table 2-6	Summary Evaluation Of Alternatives	2-7
Table 2-7	Monetary Costs Of More Viable Alternatives	2-10
Table 2-8	Monetary Costs Of More Viable Alternatives For Mt. View Sanitary District and Port Costa	2-10
Table 2-9	Comparison Of More Viable Alternatives	2-11
Table 3-1	Phased Treatment Capacity	3-5
Table 3-2	Land Use Conversion - 1975-2000	3-9
Table 3-3	Design Population 1975 - 2000	3-10
Table 3-4	Incremental Change In Population	3-10
Table 4-1	Unavoidable Adverse Impacts/ Mitigation Measures	4-2
	Unavoidable Adverse Impacts/ Mitigation Measures	4-3
	Unavoidable Adverse Impacts/ Mitigation Measures	4-4
	Unavoidable Adverse Impacts/ Mitigation Measures	4-5
	Unavoidable Adverse Impacts/ Mitigation Measures	4-6
Table 5-1	Effluent Flow and Pollutant Loadings From North Shore Industries By Type	5-11
Table 5-2	Quantities Of Wastewater Discharged From Existing Municipal Plants	5-13

Table 5-3	Annual Average VS. Dry Season Effluent BOD, SS and Coliform From Existing Plants[a]	5-13
Table 5-4	Annual Average Physical, Chemical, Biological and Bacteriological Characteristics Of Existing Municipal Discharge[b]	5-14
Table 5-5	Heavy Metal Concentration (mg/l) In Selected Municipal Effluents	5-15
Table 5-6	Concentrations Of Heavy Metals In Suisun Bay and Western Delta Receiving Waters[a]	5-17
Table 5-7	Median Concentrations Of Mercury In Surface Sediments Of San Francisco Bay[a]	5-18
Table 5-8	Summary Of Receiving Water Characteristics In Suisun Bay	5-18
Table 5-9	Plant Species On The Camp Stoneman - Dow Site	5-29
Table 5-10	Population 1970 - 1975	5-37
Table 5-11	Children Ever Born	5-43
Table 5-12	Persons Per Household	5-44
Table 5-13	Ranking Of Tracts By Growth Rate Of Dwelling Units 1970-75	5-61
Table 5-14	1975 Average Price-Single Family Detached Homes Contra Costa County Area	5-67
Table 5-15	Annual Change In Harvested Acreages, Selected Crops, 1970 - 1974	5-71
Table 5-16	Payment Capacity For Land - East Contra Costa County	5-73
Table 5-17	School Enrollment and Capacity	5-75
Table 5-18a, b, c	Financial Summary	5-76
Table 5-19	Total Within Study Area VMT 1970 - 2000	5-84
Table 5-20	Change In Long Distance Commute Destinations 1970-1975	5-91
Table 5-21	Employment and Unemployment 1970-75	5-91
Table 5-22	% Of Work VMT Generated Within Area and Out Of Area	5-96
Table 5-22a	Ambient Air Quality Standards Applicable In California	5-102
Table 5-23	Summary Of Observed Effects Of Oxidant	5-103
Table 5-24	Annual Percentage Occurrence Of Wind Patterns Favorable To Smog Importation Or Retention	5-105
Table 5-25	Total and Per Capita Energy Consumption In KWH - Equivalents	5-112
Table 5-26	Residential Energy Consumption Per Dwelling Unit	5-113
Table 6-1	Year 2000 Plant Capacities For Each Alternative	6-2
Table 6-2	Effect Of Changing Outfall Location On Steady-State Conservative Pollutant Concentration At Selected Locations	6-10
Table 6-3	Project's Addition Of Conservative Pollutant Over Existing Suisun Bay/Western Delta Levels	6-10
Table 6-4	Expected Contribution Of Proposed Project To Environmental Problems Faced By Aquatic Species In Study Area Waters[a]	6-12
Table 6-5	Expected Contribution Of Proposed Project To Environmental Problems Observed In Study Area Waters[a]	6-18
Table 6-6	Summary Of Land Disposal Systems In The Delta Lowlands & Agricultural Plain Sectors	6-36
Table 6-8	Population-Serving Employment	6-59
Table 6-9	Local Employment	6-59
Table 6-10	Employment Projections	6-60
Table 6-11	Growth In Study Area Population, Housing and Employment 1970-2000 (ABAG-MTC Projections)	6-62
Table 6-12	Commercial Volumes ($ Million)	6-65
Table 6-13	School Enrollment and Capacity	6-76
Table 6-14	Total and Per Capita Energy Consumption In KWH - Equivalents	6-93
Table 7-1	1975 Wastewater Flows and Plant Design Capacities	7-2

Table 7-2	Residential Population and Dwelling Units Potentially Accommodated By 1975 Excess Plant Capacities	7-3
Table 7-3	Population and Dwelling Unit Sewered and Unsewered Year 1975	7-4
Table 7-4	Population and Dwelling Unit Sewered and Unsewered Year 2000	7-5
Table 7-5	Growth In Population and Housing 1975 - 2000	7-6
Table 7-6	Dwelling Units Accommodated By The Year 2000 Plant Capacities Under Different Conditions Of Industrial Use Or Varying Residential Wastewater Generation Rates	7-9
Table 7-7	Vegetation Along Pipeline Route	7-17
Table 7-8	Pipeline Lengths In Thousands Of Feet	7-17
Table 7-9a	Indirect Impacts - Comparison Factors	7-20
Table 7-9b	East/Central Wastewater Management Program Comparison Of Alternatives	7-21

PROJECT DESCRIPTION

PROJECT DESCRIPTION

LOCATION

The East/Central Contra Costa County Wastewater Management Program concerns the eastern third of Contra Costa County, California. The project area presently has 90,000 residents, a part of the San Francisco Bay Region which has a present population of nearly six million. The East/Central area also lies near the smaller population centers of Sacramento and Stockton. The area's economic character is determined by its intermediate location between industrial and residential urban centers of the Bay Area and the agricultural regions of the California Central Valley.

The East/Central Study Area lies along the Sacramento and San Joaquin Rivers between 40 and 80 miles upstream from the Pacific and the entrance to the San Francisco Bay. These rivers are the major drainage for Northern and Central California and represent the State's largest fresh water resource; the water quality of this body is an important environmental objective.

Within the East/Central area, there are several distinct subareas which will be identified and used throughout this analysis to illustrate specific points of environmental impact.

The Industrial Shore is a narrow plain along the south bank of the Sacramento and San Joaquin Rivers. The Industrial Shore contains the two large incorporated cities of Pittsburg and Antioch as well as numerous, smaller, unincorporated communities, such as Shore Acres, Port Chicago, and West Pittsburg. As indicated by its name, this subarea is also the site of industry, containing several large operations centers representing nation-wide firms, such as U.S. Steel and Dow Chemical, along with several major regional industries. In this study, the Industrial Shore or Industrial Plain will be used as an important unit of analysis since its population and economy are quite distinct from the other portions of the East/Central area.

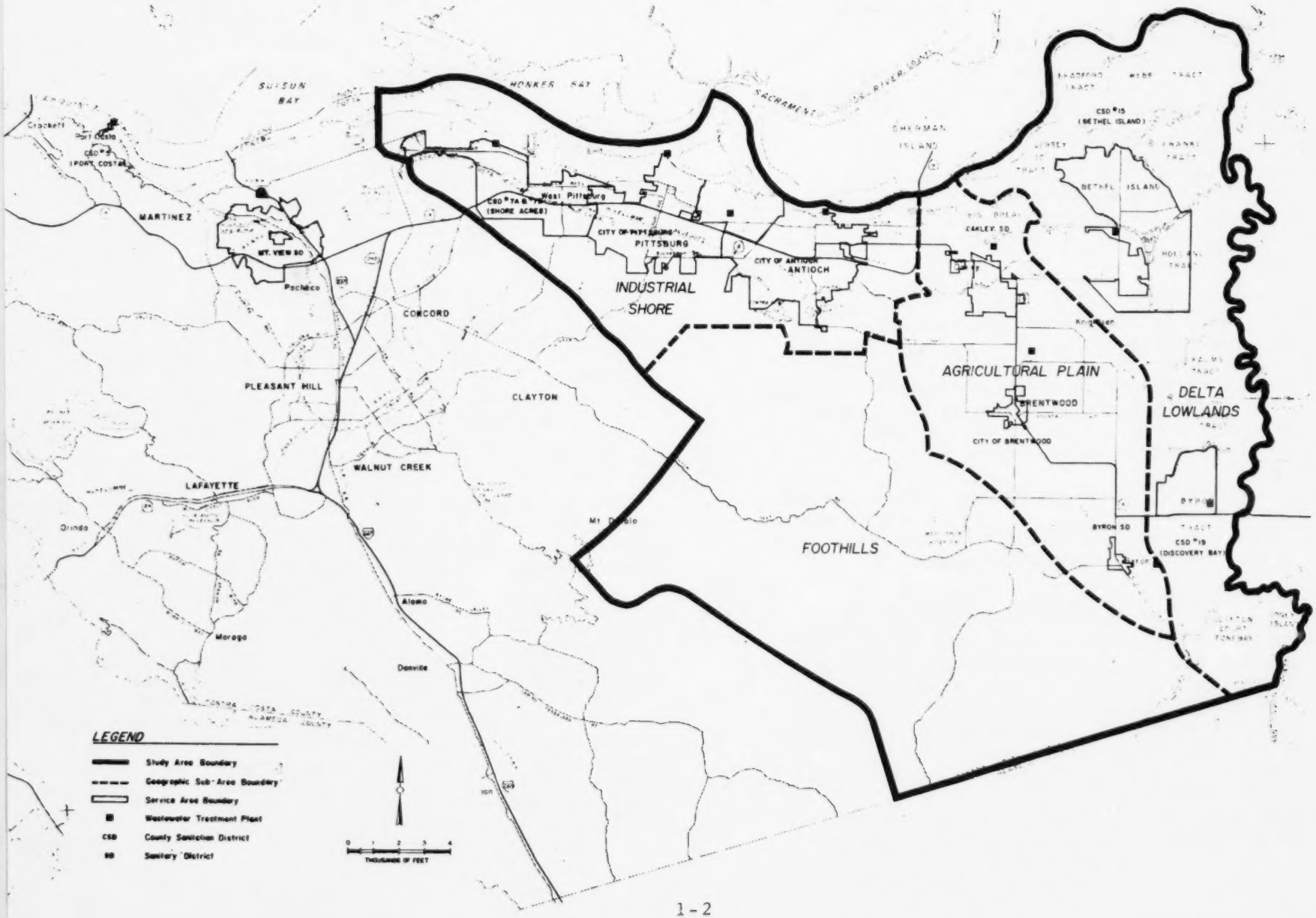
The Agricultural Plain lies further to the east on a broad expanse of flat, fertile land. Several population centers have developed here including the City of Brentwood and the unincorporated communities of Oakley, Sand Hill and Byron. The major economic activity is intensive cultivation with a constantly changing mosaic of row crops and orchards representing over a century of agricultural productivity.

Within the Sacramento - San Joaquin Delta is the low-land portion of the Study Area represented in this report by Bethel Island. These lands were diked and drained during the Gold Rush days in order to extend the agricultural area. Residential development is constrained by the flood hazard of construction below sea level, but waterfront recreation has been an important incentive for development.

The Foothills are steep, sparsely populated lands lying to the south of the Industrial Plain and to the west of the Agricultural Plain. Although included in the Study Area as part of the basin watershed, the low density development of this area will not require sewer service.

To the west of the main portion of the East/Central Study Area are the communities of Mountain View and Port Costa, which are not contiguous with the Study Area, but are included within this study for the purposes of basin water quality planning. Mountain View is an unincorporated community of 8,000 adjoining the County Seat of Martinez. Port Costa is a small community further west along the coast in the hills above the Carquinez Strait.

Figure 1-1 GEOGRAPHIC SUBAREAS AND SERVICE AREAS



WATER QUALITY PROBLEMS AND OBJECTIVES

The Sacramento-San Joaquin River System is subject to a variety of important beneficial uses. Freshwater withdrawals for irrigation and domestic water supply are made at many points upstream from Suisun Bay. The entire system is a valuable fish and wildlife habitat and much used for recreation. Industry uses large volumes of river water for cooling. Major water quality problems affecting some or all of these uses are variable salinity and dissolved oxygen (DO), biostimulants, toxic substances microbial contamination and suspended solids.

Water supply is sensitive to excessive salinity, with saltwater intrusion increased by large freshwater withdrawals and total dissolved solids (TDS) increased by agricultural drainage. Fish and wildlife are accustomed to some normal variability in salinity, but long-term changes can bring about shifts in populations of aquatic species. The water quality objectives for the Sacramento River rely on salinity control primarily through regulation of water withdrawals; domestic wastewater is not a major factor.

Dissolved oxygen levels are of major concern for maintaining fish habitat. Heavy influx of organic material creates a large biological oxygen demand (BOD) which depletes dissolved oxygen. Water quality management for DO involves reducing BOD input to levels compatible with the river's natural rate of re-oxygenation. Reduction of BOD is a major objective for wastewater treatment in the Sacramento River System.

Biostimulants are the nutrients nitrogen and phosphorous needed for algal growth. Although algae are the basis for productivity in the aquatic ecosystem, excessive algal growth leads to a large quantity of dead plant material, representing a large BOD and ultimately depleting the water's oxygen. Biostimulants are not generally considered important pollutants in the Sacramento. Although some reduction is achieved through conventional secondary sewage treatment, nitrogen and phosphorous reduction is not a major objective here.

Toxic substances include pollutants discharged into the waste system such as heavy metals, pesticides, chemicals and pollutants resulting from treatment such as ammonia and residual chlorine. In high concentration, most of these substances are acutely toxic to aquatic life and may degrade municipal water supply. In low concentration, toxic materials may interfere with normal fish migration in the river or accumulate in living tissue causing chronic toxicity damage. Some of these materials are not expected to be a problem in this location; others are subject to control, such as dechlorination. The objective is to have an effluent with at least low acute toxicity.

Microbial contamination is of principal concern as a public health problem in water supply, fishing and recreation. Domestic sewage is a potentially major source of human bacterial contamination (measured as fecal coliform) and is controlled by disinfection chlorination. The objective is to have the waters of the Sacramento River System suitable for all forms of human contact.

Suspended solids cause the opacity of water referred to as turbidity. In the Sacramento River System, a heavy load of inert silt from erosion in the Central Valley blocks light below a few feet of depth, limiting algal growth. Suspended solids from domestic wastewater are not an important contributor to overall turbidity. Wastewater solids, however, often comprise undesireable BOD, bacterial and toxic components and their reduction by secondary treatment is a major objective in this location.

Treatment Requirements

The waters of the Sacramento-San Joaquin Rivers system and the San Francisco Bay Estuary are subject to a variety of important beneficial uses. Foremost among these are water supply for domestic use, irrigation and recreation. In order to protect the river system, several agencies at the Federal, State and local levels are responsible for water quality control. The U.S. Environmental Protection Agency (EPA) is required to oversee the State's administration of the Federal Water Pollution Control Act (PL 92-500, 1972). Under the terms of this act, discharge requirements are set by the National Pollutant Discharge Elimination System (NPDES). The State of California's own water quality law, the Porter-Cologne Act (1969), gave to the nine Regional Water Quality Control Boards (RWQCB's) which have the responsibility for setting discharge standards both for point sources, such as wastewater treatment plants and for non-point sources, such as agricultural runoff. The RWQCB's have the authority to enforce standards by the issuance of Cease and Desist Orders where non-compliance is observed.

The East/Central area falls under the jurisdiction of two RWQCB's: the San Francisco Bay Board and the Central Valley Board with the dividing line running roughly between the Cities of Pittsburg and Antioch. The entire area, of course, is subject to the overall State and Federal regulation and, thus, a series of discharge standards have been applied

Table 1-2

EXISTING WASTE DISCHARGE COMPLIANCE SCHEDULES

Agency	Issuing Board (1)	Board Order No.	NPDES Permit No.	Specified Final Completion Dates: Develop Conceptual Plan	Complete Final Construction Plans	Complete Construction	Full Compliance	Permit Expiration Date
City of Antioch	CV	74-568	CA0079278	4-1-75	10-1-75	---	---	6-30-77
City of Brentwood	CV	59-3	(2)	---	---	---	(2)	---
City of Pittsburg								
Montezuma	SF	74-109	CA0037508	2-1-75	---	---	12-1-77	7-1-77
Camp Stoneman	SF	74-108	CA0037761	---	---	---	11-1-77	7-1-77
C.S.D. No. 5	SF	74-75	CA0037885	4-1-75	10-1-75	---	7-1-77	9-1-79
C.S.C. No. 7A	SF	74-110	CA0037940	---	---	8-1-75	1-1-76	7-1-77
C.S.D. No. 15	CV		CA0080217	---	10-1-76	2-1-80	2-1-80 (5)	4-1-80
C.S.D. No. 19	CV	74-352	CA0078590	---	---	---	6-28-74	6-1-79
Byron S.D.	CV	74-511	CA0079723	8-1-75	1-1-76	5-1-77	7-1-77	11-1-79
Mt. View S.D.	SF	74-134	CA0037770	11-1-74	2-1-75 (4)	---	2-1-76	12-1-77
Oakley S.D.	CV	74-507	CA0079707	1-1-76	5-1-77	---	---	6-30-77

(1) CV: Central Valley Region; SF: San Francisco Bay Region
(2) Waste Discharge Requirement issued pursuant to Porter-Cologne Act
(3) Effective when adopted on 2-18-59
(4) Start construction
(5) Discharge to surface water course prohibited thereafter

to each of the existing wastewater treatment facilities within the project jurisdiction. Applicable permits and dates of compliance are set forth in Table 1-2 . It should be noted from the earlier description of the existing service treatment facilities that few are in compliance with applicable permits. Thus, the major motivation for the East/Central Wastewater Management Program is to provide a system whereby existing discharges may be either eliminated or upgraded in effluent quality such that the beneficial uses of the river system may be protected in the terms of existing law. Project design is in compliance with PL 92-500 and the Porter-Cologne Act.

Existing Wastewater Service

At present, eleven sewage treatment facilities serve nearly 85,000 people within the Project Area under the jurisdiction of ten local agencies.

The westernmost portion of the contiguous Study Area comprises the unincorporated community of Shore Acres, served by County Sanitation Districts 7A and 7B. The Shore Acres plant, over twenty years old, provides primary treatment with chlorination of predominately domestic wastes from a population of 11,000, the majority of which is sewered at present. Although not currently meeting discharge water quality standards, Shore Acres has sufficient capacity to serve its present population with its present design. of its present design.

The City of Pittsburg operates two treatment facilities serving the population of 25,000, nearly all of which is sewered. Both plants provide primary treatment with chlorination and discharge to the Sacramento River and to New York Slough. Both serve a large industrial component and the Montezuma plant is currently experiencing flows in excess of present design. Neither plant meets permit standards.

To the east, the City of Antioch with a population of 35,000 operates a single treatment plant which provides primary treatment with chlorination to a mixed domestic and industrial service area. The plant discharges to the San Joaquin River and is presently at design capacity. The Antioch plant does not meet permit standards.

Within the Agricultural Plain, the Oakley Sanitary District operates a small septic tank system with discharge to the Delta at Big Break. The system serves roughly three quarters of the unincorporated community's present population of 2800 persons and is at capacity; permit compliance is doubtful. Due east of Oakley is the recently formed County Sanitation District 15 for Bethel Island. At present, the service area population of 1700 is not served by any significant active facility and individual or small group septic tanks with ultimate surface interception and pumped discharge to the Delta are the major form of present treatment. This discharge does not provide Permit compliance. A sewage collection system is currently being designed under a State and Federally funded project; the system is expected to be completed by 1977.

The City of Brentwood, at the center of the Agricultural Plain, has a large, adequate trickling filter treatment system with land disposal that serves 85% of the present population of 4300 persons. To the east of Brentwood is the new recreational waterfront development called Discovery Bay which has recently been organized as County Sanitation District 19. These new facilities comprise an aerated pond with chlorinated discharge to the Delta sloughs but serve only a minute population at present.

The unincorporated community of Byron at the extreme southeastern corner of the Study Area organized as the Byron Sanitary District comprises a small degree of biological treatment followed by land disposal through evaporation percolation bonds and a small degree of unchlorinated drainage dis-

charge into Indian Slough. This violates current standards. The Sanitary District serves most of the community's population of 300 persons.

Within the East/Central Study Area, the major population concentration in the Sand Hill vicinity has no sewer service either planned or present. The area's population of 2600 persons relies on septic tanks in a soil condition that makes the drainage fields fall below current County public health standards.

Overall, 91% of the Study Area's population of 83,000 persons has access to sewer service at present. With the exception of Brentwood, nearly all of the area is presently in need of upgraded treatment levels and/or expansion to meet present or short-term projected overloads in service.

To the west of the contiguous East/Central Study Area are the unincorporated communities of Mountain View and Port Costa. Mountain View is presently governed by the Mountain View Sanitary District which serves a population of 9,000 persons. Current facilities comprise biological treatment through a trickling filter and discharge into an isolated strip of marshland which leads to Suisun Bay. Plant capacity is above present demand and the Mountain View District meets all current discharge requirements.

The small community of Port Costa to the extreme west comprises a population of 250 persons presently served through the Port Costa Sanitary District by a large septic tank and outfall to the Carquinez Strait.

The Mountain View facility is in need of only minor modification since it has adequate capacity and treatment level. The Port Costa facility, on the other hand, is required under current law to upgrade its treatment level.

GRANT APPLICANT DESCRIPTION

The East/Central Costa County Wastewater Management Agency is a "joint exercise of powers agency" formed under the laws of the State of California. It is commonly referred to as the EAST/CENTRAL COUNTY AGENCY. The public jurisdictions who are members of the Agency are the Cities of Antioch, Pittsburg and Brentwood; the County of Contra Costa; the Contra Costa County Water District; the Mt. View and Oakley Sanitary Districts; and Contra Costa County Sanitation Districts Nos. 5, 7A, 7B, 15 and 19, serving the communities of Port Costa, West Pittsburg, Shore Acres, Concord Naval Weapons Depot, Bethel Island and Discovery Bay.

PROPOSED PROJECT

The project design for the East/Central Wastewater Management Program is derived from a consideration of existing wastewater treatment in the area including the characteristics of service areas, present wastewater generation and existing treatment facilities, the water quality in the area including present beneficial uses and future water quality objectives, and the population projected for the East/Central area for the year 2000. A thorough discussion of project design criteria alternative development and ultimate selection of the Apparent Best Alternative are contained in the Project Report for the East/Central Contra Costa County Wastewater Management Study prepared by CDM/KKA Consultants in association with SRI. The project report is mandated by State Clean Water Guidelines and is a companion volume to this EIR/EIS.

Design Population

In order to serve the East/Central area until the Year 2000, the project's design lifetime, population estimates were derived from consideration of regional and local planning by the project design team (Table 1-4). For the purposes of clean water grant administration, funding is limited to facilities sized to serve a population projection known as E-0, calculated by the State Department of Finance. Briefly, E-0 is a low growth (ultimately, no growth) population projection based on "E" fertility of 2.11 children per woman (replacement level) and "0" migration into the State of California. The E-0 projections, fall below the population projections used for project design and, thus, some portions of the facilities proposed is not eligible for the 87 1/2% public funding. The difference between the Design Population and E-0 is intended to represent the design team's appraisal of the area's growth potential from in-migration in excess of that small amount allocated by the regional planning authorities.

In all, by the year 2000 the project will accommodate an 85% increase in Study Area population. The service to this population will be increased in several stages as shown in Table 1-3 . Stage I covering anticipated demands until the year 1985 or thereabouts for most districts is the portion of the project which achieves the proposed sub-regionalization of the Industrial Shore and accomplishes the upgrading of treatment facilities for permit compliance. Stage II, and successive stages, expand the facilities in order to meet the pressures of growth in the final years of the project planning period.

Table 1-3

COMPARISON OF E-0 AND PROJECT DESIGN POPULATION IN SEWER SERVICE AREAS*

	1976			1986			1996		
	E-0	Project	Δ%	E-0	Project	Δ%	E-0	Project	Δ%
Shore Acres	11,500	11,200	-2.6	14,700	15,000	2.0	18,300	19,000	3.8
Pittsburg	25,200	25,400	0.8	32,200	35,000	8.7	40,100	40,000	-0.3
Antioch	35,300	35,500	0.6	45,200	47,600	5.3	56,200	59,100	5.2
NORTH SHORE	72,000	72,100	0.1	92,100	97,600	6.0	114,600	118,100	3.1
Oakley	2,800	2,800	0	3,000	4,000	33.3	3,000	4,800	60.0
Sand Hill	2,600	2,600	0	2,600	3,100	19.2	2,800	3,600	28.6
Brentwood	4,200	4,300	2.4	4,200	5,800	38.1	4,500	7,800	73.3
Bethel Island	1,980	1,980	0	1,980	2,400	21.2	1,980	3,400	71.7
Discovery Bay	80	80	0	80	900	1,025.0	90	2,100	2,233.3
Byron	300	300	0	300	500	66.7	320	700	118.8
AGRICULTURAL PLAIN-Bethel Island	11,700	11,780	0.7	12,000	16,700	39.2	12,500	22,400	79.2
SUBTOTAL E/C	83,700	83,910	0.3	104,100	114,300	9.8	127,100	140,500	10.5
Port Costa	260	260	0	300	360	20.0	350	400	14.3
Mountain View	9,200	9.200	0	11,300	12,300	8.9	12,100	16,300	34.7

Project figures are from Project Report.

*E-0 as of 7/30/75 except for Bethel Island which was revised based on the 1975 Contra Costa Special Census.

Table 1-4
DESIGN POPULATIONS

Service Area Population
Per Cent Sewered
Sewered Population

Area	1974	1975	1976	1978	1986	1996	2000
Shore Acres	11,100 97 10,800	11,100 97 10,800	11,200 97 10,900	11,700 97 11,300	15,000 97 14,600	19,000 97 18,400	20,000 97 19,400
Pittsburg	23,500 98 23,000	24,400 98 23,900	25,400 98 24,900	27,500 98 27,000	35,000 98 34,300	40,000 98 39,200	41,000 98 40,200
Antioch	33,000 98 32,300	34,200 98 33,500	35,500 98 34,800	37,500 98 36,800	47,600 98 46,600	59,100 98 57,900	62,000 98 60,800
Oakley	2,760 70 1,890	2,750 71 1,950	2,800 72 2,020	3,000 74 2,220	4,000 80 3,200	4,800 87 4,180	5,050 90 4,550
Sand Hill	2,570 0 0	2,600 0 0	2,630 0 0	2,700 10 270	3,100 75 2,330	3,600 85 3,060	3,800 90 3,420
Bethel Island	1,620 0 0	1,670 0 0	1,700 0 0	1,840 95 1,750	2,400 96 2,300	3,400 97 3,300	3,800 98 3,720
Brentwood	4,100 85 3,490	4,200 85 3,570	4,300 85 3,660	4,600 86 3,960	5,800 87 5,050	7,800 89 6,940	8,800 90 7,920
Discovery Bay	80 100 80	80 100 80	80 100 80	100 100 100	900 100 900	2,100 100 2,100	2,500 100 2,500
Byron	300 88 260	300 88 260	300 88 260	350 88 310	500 88 440	700 90 630	800 90 720
Subtotal	78,970(1) (91) 71,820	81,300 (91) 74,060	83,910 (91) 76,620	89,290 (94) 83,710	114,300 (96) 109,720	140,500 (97) 135,710	147,750 (97) 143,230
Port Costa	250 100 250	250 100 250	260 100 260	280 100 280	360 100 360	400 100 400	420 100 420
Mt. View	8,800 94 8,270	9,000 94 8,460	9,200 94 8,650	9,700 94 9,120	12,300 95 11,700	16,300 96 15,600	18,000 96 17,300
Grand Total	88,020(1) (91) 80,340	90,550 (91) 82,770	93,370 (92) 85,530	99,270 (94) 93,110	126,960 (96) 121,780	157,200 (97) 151,710	166,170 (97) 160,950

(1) Derived percentages from totals.

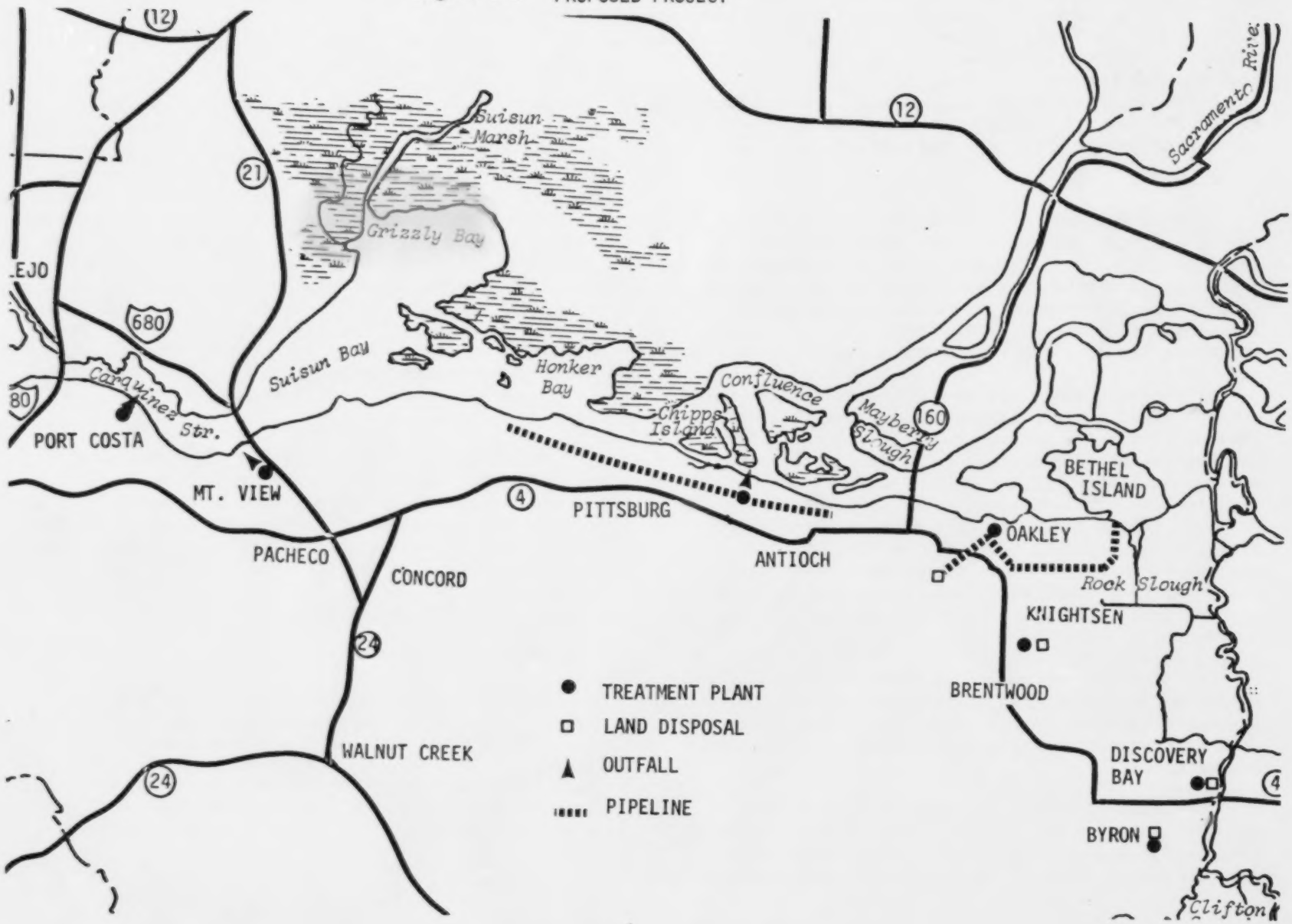
Facilities - Design Treatment

Based on the alternative analysis summarized above and described in greater detail elsewhere in both the project report and this EIR/EIS, the East/Central Agency selected the alternative designated as 307West/306East as the Apparent Best Alternative project (Figure 1-2). The project proposes two subregional consolidations within the East/Central area. The largest of these is a conveyance system uniting the Industrial Shore from Shore Acres to Antioch and providing treatment at the secondary level near the present Camp Stoneman site. The second consolidation conducts sewage from Bethel Island and a portion of the presently unsewered community of Sand Hill to Oakley for treatment and land disposal by evaporation/percolation. All other districts will remain independent; in the East County, Brentwood, Discovery Bay and Byron will receive varying degrees of upgrading and expanded land disposal facilities. Outside the contiguous Study Area, the Mountain View facility will receive minor modifications and continue its discharge through the marsh into the Sacramento River. Port Costa will have a secondary treatment facility provided for discharge into Carquinez Strait.

The conveyance system for the Industrial Shore consolidation combines 25,000 feet of gravity interceptors with 45,000 feet of force main with pump stations to conduct raw sewage along the relatively flat extent of the Industrial Plain. A treatment plant outfall for treated wastewater runs for 3500 feet from the plant at the Camp Stoneman site between the Cities of Pittsburg and Antioch and the outfall at New York Slough.

The subregional treatment facility is designed to provide secondary treatment by biological process and to remove at least 80% of the influent biological oxygen demand (BOD) and suspended solids in order to provide a plant effluent of not more than 30 mg/l in compliance with current discharge standards. In the

Figure 1-2 PROPOSED PROJECT



process of biological treatment for BOD, there is significant reduction in nitrogen, particularly ammonia. Heavy metals and toxic substances, such as pesticides and chemicals, are either broken down or combined with sediment and removed. Further, the secondary effluent is chlorinated for disinfection and dechlorinated by the addition of sulfur dioxide resulting in a wastewater stream which has low toxicity to aquatic life.

Treated effluent will be disposed by discharge to New York Slough through a "tee" shaped diffuser 200 feet long. The specific design of the diffuser awaits second stage engineering assessment but will generally comprise an underwater pipe with small ports along its length that inject effluent at velocities sufficient to insure rapid mixing within the vicinity of the outfall.

At present, there are two alternative sites under consideration for the Camp Stoneman subregional facility. Located only a few hundred yards apart, the principal differences between the two sites lie in the amount of land available and the condemnation process necessary for its use. The easternmost site alternative would be large enough to allow the construction of an effluent polishing pond of sufficient capacity for the storage of nearly 30 hours of average flow. The polishing pond would provide an advantage in improving the effluent quality, in allowing temporary storage for possible reclamation use nearby, and for modulating discharge according to tidal cycles which could further minimize the impact of these municipal wastewaters on the Sacramento-San Joaquin System. All the sites have sufficient space for further expansion should increased capacity or advanced water treatment become necessary.

The capacity of the subregional facility has been designed for two stages. Stage I will handle an average dry weather flow of 9.48 mgd suitable for population projected to the year 1986, and second stage flow of 12.47 mgd suitable for population projected to the year 2000.

Oakley/Bethel Island

Raw sewage will be conveyed from Bethel Island by 29,000 feet of force main to a new treatment plant at Oakley. Existing facilities on Bethel Island (CSD 15) will be abandoned and will revert to former private ownership. The Oakley plant, sited near the existing facility, will provide aeration and chlorination prior to land application. Approximately 27 acres will be required for an evaporation/percolation disposal system. The disposal site lies in an agricultural area with a surface layer of fine sand or sandy loam overlaying an impervious clay layer which is ideal for absorption of effluent and conduction through the ground water system to the river.

Brentwood

Since Brentwood currently has adequate capacity and treatment, the need for new facilities depends on further monitoring and permit studies conducted by the Central Valley Regional Water Quality Control Board; otherwise, only minimal improvements are recommended at present for the plant itself. A modification or expansion of the land application disposal site will require an additional 26 acres.

Discovery Bay (CSD 19)

This new system requires no internal plant modifications but a land application system is required to eliminate the currently unacceptable discharge to the Delta slough waters. The evaporation/percolation ponds will require as much as 70 acres throughout the design period. The specific requirements will depend on the rate of growth for the Discovery Bay community.

Byron Sanitary District

Little treatment modification is required; elimination of discharge by an expanded evaporation/percolation site will require 22 acres of land.

Mountain View Sanitary District

Since the present treatment works at Mountain View are modern, with adequate treatment and capacity, little modification will be required to serve the water quality objectives or population projections of this project. The pilot marsh enhancement program used to polish plant effluent will continue and may require modification or supplemental chlorination should further studies so warrant.

Port Costa (CSD 5)

The small size of the projected Port Costa community permits the installation of a package plant for secondary treatment. Effluent will be chlorinated and discharged into the Carquinez Strait.

Reclamation and Reuse

Since water is an important resource, conservation of existing supply by reclamation and reuse of treated wastewaters is an important consideration. At present, however, economic factors severely limit the application of current reclamation technology to any existing market. Water quality standards for reuse vary depending on the user. Irrigation for food crops requires advanced disinfection and quality control that is not required by irrigation for pasture or fiber crops. Industrial reuse has specialized needs, depending on the process involved, but, in general, water of secondary treatment quality or better is required.

All project facilities produce an effluent stream suitable for many forms of reuse. The difficulty of providing the long-term commitment necessary for justifying expensive equalization storage and conveyance facilities effectively removes reclamation from active consideration within the present project study. The option for future reuse programs is retained, however, and may indeed become important in the East County agricultural area in the vicinity of project proposed land disposal operations.

Sludge Disposal

The suspended solids removed from sewage along with the bacterial residue of biological treatment are removed in the form of sewage sludge. The sludge will be processed by chemical conditioning and dewatering with ultimate disposal in a sanitary landfill.

Project Cost

The project is planned for two basic stages of construction. Within the Industrial Shore, the first stage includes the conveyance system to conduct raw sewage from the outlying districts to a new central, subregional treatment facility at Camp Stoneman. Other first stage construction costs involve the land disposal systems within the East County area, upgrading for Port Costa and minor improvements for Mountain View. In sum, between the annual operations and maintenance costs and the debt service for bond issues, the local agencies will have to pay nearly $1.8 million annually.

Table 1-5 ESTIMATED 1976 TOTAL PROJECT COSTS[1] OF STEP 1 FACILITIES

Facility	Estimated Capital Cost (thousand dollars) Treatment and Disposal Facilities	Conveyance Facilities	Total
Industrial Shore[2] Subregion	23,288	10,108	33,396
Oakley/Bethel Island Subregion	2,586	2,627	5,213
Brentwood	878	0	878
Discovery Bay	450	0	450
Byron	244	0	244
Port Cost	228	0	228
Mt. View	95	0	95
Totals	27,769	12,735	40,504

(1) Total project cost includes construction cost (bid price estimated at ENR index value of 2900) plus allowances for contingency, engineering, administration, legal, financial, etc.

(2) Includes Antioch, Pittsburg, CSD No. 7A, and CSD No. 7B.

LOCAL SHARE OF 1976 PROJECT COSTS Table 1-6

Facility	Local Share of Project Cost (thousand dollars) Treatment and Disposal Facilities	Conveyance Facilities	Total Local Share	%
Industrial Shore[2] Subregion	4,486	2,184	6,670	20
Oakley/Bethel Island Subregion	922	1,342	2,264	43
Brentwood	263	0	263	30
Discovery Bay	348	0	348	77
Byron	81	0	81	33
Port Cost	86	0	86	38
Mt. View	42	0	42	44
Totals	6,228	3,526	9,754	24

Table 1-7 PROJECTED USER CHARGE - 1980

Service Area	ADF (mgd)	Annual O&M ($1,000) (1)	Service Charge Per 1000 gal	Avg. Monthly Charge per Residence (2)
Shore Acres	1.05	117	$0.305	$1.87
Pittsburg	3.64	384	$0.289	$2.08
Antioch	3.06	313	$0.280	$1.59
Oakley	0.24	47	$0.537	$3.43
Bethel Island	0.16	31	$0.531	$3.49
Brentwood	0.51	82	$0.441	$3.77
Discovery Bay	0.034	15	$1.209	$10.12
Byron	0.037	15	$1.111	$8.70
Mt. View	0.89	119	$0.366	$2.54
Port Costa	0.038	20	$1.442	$8.95

(1) Inflated to 1980 costs.

(2) Based on an average of 3.0 people per residence.

Table 1-8 PROJECTED TAX RATE - 1980

Projected Assessed Value ($1,000)	Bond Interest ($1,000)	WCRF[1] Payments ($1,000)	Total ($1,000)	Tax Rate per $100 AV	Annual Property Tax $5000 AV	$7500 AV
46,812	81	273	354	$0.756	$37.81	$56.72
155,259	232	779	1011	$0.651	$32.56	$48.84
214,123	211	705	916	$0.428	$21.39	$32.08
17,305	110	126	236	$1.364	$68.18	$102.28
17,429	68	76	144	$0.826	$41.31	$61.97
23,130	21	120	141	$0.609	$30.45	$45.68
9,081	28	37	65	$0.716	$35.79	$53.68
2,006	6	24	30	$1.496	$74.80	$112.20
96,874	3	288	291	$0.300	$15.00	$22.50
925	7	11	18	$1.946	$97.30	$145.95

(1) Wastewater Capital Reserve Fund payment for both new and existing conveyance, treatment and disposal facilities.

Table 1-9 ESTIMATED 1976 TOTAL PROJECT COST OF FUTURE FACILITIES

Facility	Estimated Capital Cost (thousand dollars) 1984	1985	1987	1992
Industrial Shore Subregion	8,866			
Oakley/Bethel Island Subregion		177	340	
Brentwood			957	
Discovery Bay	200			200
Byron			55	
Port Costa				
Mt. View				
Totals	9,066	177	1,352	200

Table 1-10 PROJECTED BOND REQUIREMENTS

	Year of Bond Issue 1978	1984	1987	1992
Amount in 1976 Dollars (millions)	9.754	9.243	1.352	0.200
Amount in Inflated Dollars (millions)	11.802	19.851	3.873	0.919
Participation by Community (%)				
CSD No. 7A and 7B	10.6	17.7		
City of Pittsburg	30.3	28.1		
City of Antioch	27.5	49.9		
Oakley Sanitary District	14.4	1.2	14.3	
CSD No. 15	8.8	0.9	10.9	
City of Brentwood	2.7		70.8	
CSD No. 19	3.6	2.2		100.
Byron Sanitary District	0.8		4.0	
Mt. View Sanitary District	0.4			
CSD No. 5	0.9			

Table 1-11 ANNUAL DEBT SERVICE COSTS

Bond Issue	1980	1985	1990	1995	2000	2005	2010	2015
I	967,545	967,545	967,545	967,545	967,545			
II		1,627,414	1,627,414	1,627,414	1,627,414	1,627,414		
III			317,514	317,514	317,514	317,514	317,514	
IV				75,341	75,341	75,341	75,341	75,341
TOTAL	967,545	2,594,959	2,912,473	2,987,814	2,987,814	2,020,269	392,855	75,341

Status of Approval of Apparent Best Alternative

The apparent best alternative was chosen by the East/Central County Agency after evaluation of preliminary data from the engineers and EIR/EIS consultants. A subsequent review by various water quality regulatory agencies revealed that the proposed discharge of treated wastewater to New York Slough which would be caused by the proposed subregional treatment plant near Camp Stoneman may not be desirable. Alternatives involving a subregional facility near Camp Stoneman dischargingto the Sacramento River north of Browns Island or a subregional facility at Shore Acres discharging to Suisun Bay (Alternative 203) appear to have less adverse impact on water quality.

Following the public review of this Draft EIR/EIS and the development of additional data to quantify the water quality impacts of discharges at alternative sites, the Environmental Protection Agency will decide which alternative should receive Federal funding for implementation.

2

COMPARISON OF VIABLE ALTERNATIVES

ALTERNATIVE WASTEWATER MANAGEMENT CONCEPTS

Regionalization

Consolidation of treatment and disposal in one central facility for wastewater generated by a region comprising many independent communities is referred to as regionalization. This will be contrasted with non-consolidation or retention of local treatment. Each means of managing a regional wastewater management has both political advocates and opponents as well as technical advantages and disadvantages.

Regionalization is usually preferred by representatives of large governmental jurisdictions, at least in part because problems of monitoring and policy implementation more closely match their scale of administration: one large facility in a coherent system as opposed to many small facilities in independently operated systems. On the other hand, regionalization is usually resisted by local agencies of small jurisdiction since it represents a loss of community self determination. Loss of local control is especially objectionable when combining two communities of unlike character and differing needs under one regional system. In particular, smaller towns are often apprehensive that their interests will be overridden by the stronger voices of larger cities in the regional system.

Several economic considerations argue both for and against regionalization. On one hand, traditional economics of scale dictate that many small plants are more expensive to construct, operate and maintain, due to duplication of facilities and inefficiencies of labor than one large plant. Shared costs for a regional facility yield better bond rates for its financing. On the other hand, one large regional facility requires extensive new construction for all components to meet a given level of treatment, whereas in a non-consolidated program each local plant facilities may have salvage value and can often achieve that same level of treatment simply by adding on to existing facilities. A large regional facility involves not only a greater initial cost, but a very significant conveyance system cost. After being converted to storage facilities, all the plants participating in the program must be interconnected, possibly over long distances.

Engineering and environmental costs and benefits also fall on both sides of the question, some favoring regionalization of waste treatment, others favoring non-centralized, local treatment, even to the point of paradox. For example, centralized treatment with its single effluent outfall into receiving waters affords the opportunity to limit the release of pollutants to the most advantageous place in the environment, that with the greatest assimilative and dispersive capacity. On the other hand, discharge from a large regional plant represents a heavy concentration of pollutants in one place; local treatment with its many, scattered, smaller discharges represents an equivalent but more diffuse burden, so that no single portion of the environment must handle as large an initial pollutant load.

On the closely related topic of probability of plant failure, there are also opposing points. Although a large facility may have a lower statistical probability of failure due to the inclusion of many alternative pathways, holding tanks, etc. for the waste, it is also true that most plant failures in general are due to human error in plant operation. Probabilities of operator error are much reduced in a small, relatively uncomplicated plant.

When a plant failure does occur in a large municipal plant, environmental consequences are more damaging than with failure of a small local plant. However, precisely because the damages are acute and dramatic, immediate remedial action is much more likely for a large plant than for failure of a small plant where subtle damage can persist uncorrected for months.

Regionalization facilitates reclamation or reuse of treated effluent and sewage sludge since a large plant can provide marketable quantities of reusable product and can more readily afford any treatment pro-

cesses necessary to make the wastes marketable. Potential recycling of materials and concomitant reduction of water pollution is more feasible in a consolidated system provided that a ready market for those materials exists nearby.

From the standpoint of a land-use impact, regionalization can lead to undesireable urban corridor growth and loss of agricultural land as a result of its extensive network of pipelines. The conveyance system for raw wastewater can also allow transfer of population service capacity within the regional system. Pipelines are usually sized more generously than are facilities since the latter is more easily expanded in small increments. That means that allocation of system growth capacity cannot be strictly determined in advance.

The selection of the best apparent alternative by the Agencys represents a compromise on most or all of the above arguments for and against regionalization. Briefly, the economic, engineering environmental points in favor of regionalization were more compelling in the North Shore portion of the Study Area. Shore Acres, West Pittsburg, Pittsburg and Antioch were consolidated in a "sub-regional" system in recognition of their socio-cultural, economic and political compatibility. On the other hand, Port Costa and Mountain View are geographically separate and distinct communities and were not forced into consolidation. Similarly, the rural East County communities of Bethel Island, Oakley, Brentwood, Byron and Discovery Bay were viewed as having characteristics and needs distinct from each other and, in general, distinct from the North Shore urban portion. The arguments favoring local treatment took on meaning in this area of scattered communities; the East County was not consolidated. Finally, it was in recognition of the distinct character of the entire Study Area that resulted in the decision that the high conveyance cost of connection to the rest of Contra Costa County for wastewater treatment was not warranted.

Surface Water Discharge

Surface water discharge has great potential as a waste disposal method in the North Shore portion of the Study Area, but almost none in the rural East County area. The East County has no dynamic waterway within reasonable distance for economically feasible pipeline wastewater transport. Old River (forming the eastern Study Area boundary) is sufficiently close, yet its waters are too sluggish, small in volume, poor in assimilative capacity due to heavy agricultural drainage, and lacking in ultimate access to the open sea (often flows in reverse, towards Clifton Court Forebay). The East County communities are also widespread and would require expensive pipeline connections. In contrast is the presence of the continuously flowing Sacramento and San Joaquin waters available for dilution and tidal dispersion west of Oakley and immediately adjacent to the North Shore communities.

Consequently, surface discharge was ruled out for the East County east of Antioch. Surface discharge is a strongly considered alternative for the North Shore to be compared with reclamation/reuse, land disposal and other methods as viable choices for management of Study Area municipal effluents.

Land Disposal

As an alternative to disposing of treated wastewater in surface waters, land disposal is available under certain conditions. In addition, Reclamation and Reuse is a disposal alternative with supplemental benefits considered in the next section. Evaporation basins have the most potential for disposing of wastewater in the East County area because the large land requirement for such systems makes them most viable for small rural communities for which relatively inexpensive land is readily available.

Indirect discharge of treated wastewater to local waterways or the Sacramento-San Joaquin Delta is another viable means of disposal. Usually, this method consists of applying treated wastewater to land under controlled conditions of site selection and management. The waste-

water does not evaporate or percolate into the local groundwater table and is eventually received as surface water. The eastern portion of the Study Area has the most potential for the indirect discharge disposal. There is more available land with the necessary infiltration and percolation capacity than in the Industrial Shore. Also, the local domestic groundwater supplies appear to be overlain by a substantial impermeable layer or layers as indicated by available soils information. Deep groundwater is, therefore, protected from wastewater applications. Common systems of applying wastewater for indirect discharge are infiltration percolation basins and sprinkler or flood field systems, depending on the limiting application rates of potential sites. Low application rates require large application areas and more extensive distribution systems and are normally more expensive than high rate systems. Careful site selection, soil, climatological and groundwater evaluations are necessary to determine the optimum application system for the indirect discharge method.

Because evaporation basins and indirect discharge had the greatest potential for the Study Area, and were suited for use in the East County area, they were chosen to supplement North Shore surface discharge as additional means of disposal for Study Area effluent. Percolation was chosen in the northern East County (Oakley and Brentwood) where substrata are more permeable; evaporation ponds were chosen for the southern East County (Byron, Discovery Bay) where soils are less permeable.

Reclamation/Reuse

Treated wastewater can be viewed as a valuable resource in an area of water shortage. Reclamation or reuse not only offers the opportunity for disposal, but environmental impact may be replaced by beneficial use.

Industrial use includes effluent use indirectly as cooling water or directly as process water. Quality requirements depend on specific applications and feasibility is determined by treatment plant proximity to industrial sites and by the unit cost of supplemental treatment compared to the cost and availability of other water sources.

Landscape irrigation has some potential in small Study Area facilities such as cemeteries or neighborhood parks. Larger regional parks are typically not irrigated or are too remote for economical effluent delivery.

Groundwater recharge has only limited potential in the Study Area since most of the wastewater-generating portions are underlain by generally impermeable clay layers. Besides the prohibitive cost of pumping effluent to distant recharge centers, public health agencies currently have very stringent treatment requirements for recharge of domestic groundwater supplies with wastewater.

Recreational impoundments such as fountains or golfcourse ponds have limited reclamation potential since no human-contact recreation would be prohibited unless the effluent were adequately disinfected, oxidized, coagulated and filtered. Moreover, about 5000 acres of small impoundments would be necessary if evaporation were the only means of disposing of project wastewater.

Marsh enhancement is a recent innovation for using reclaimed wastewater to preserve marsh ecosystems by suffusing them with supplies of non-saline water. While there is significant potential for marsh enhancement near Oaklay, these acres of marshland are privately owned, and the results of Mountain View's pilot program are being awaited until marsh enhancement is deemed a feasible disposal method.

Industrial reuse of treated effluent from this project is considered unlikely in the light of the results of the SRI evaluation of reclamation/reuse potential. According to this study, the two paper mills in the area, which account for 54% of the potential demand for reclaimed water, have too widely fluctuating and seasonal

demands. Of the remaining 43% of stable potential demand, the only industries near to the Pittsburg/Antioch area - U.S. Steel and Dow Chemical U.S.A. - have standards requiring higher quality water than a secondary-treated municipal effluent. In addition, expensive studies and treatment equipment would be required of treated municipal effluent reuse by Dow or U.S. Steel. The SRI study does not recommend including capacity for involvement of industry in the wastewater management program. The study does recommend sufficient flexibility to allow for advanced wastewater treatment at some future time should industrial reuse become more feasible; the proposed subregional plant at Camp Stoneman is designed to allow future advanced treatment.

Agricultural reuse is unlikely with this project mainly because potential fields for application are so distant that overland conveyance by either pipeline or truck is not presently economically feasible. There is no economic advantage sufficient to warrant investment in a reclaimed wastewater system.

Sludge Disposal

Sludge is the highly organic waste resulting from municipal wastewater treatment. Since the system used to process sludge depends upon its method of final disposal, and since each method has different potential benefits and hazards, five alternatives were considered for final disposal of processed sludge.

Lagooning consists of placing undewatered but digested sludge to settle and compact in shallow earth basins. Because this method, although inexpensive and simple, requires large land areas and poses potential odor problems, it was not considered acceptable for the urban North Shore sub-regional facility.

Spreading on land of heat-dried or air-dried sludge, and subsequent plowing under as a soil conditioner in agricultural fields, is practiced by a number of large American cities. However, it was rejected as a means of final disposal because of a number of uncertainties regarding health of plants growing in such soil, possibilities of pathogen hazards in food plants, and the economic inefficiencies of marketing and distribution of the product.

Ocean disposal of sludge was not considered a viable alternative. Ocean or estuary discharge of sludge is prohibited by the State Water Resources Control Board and strongly discouraged by the Environmental Protection Agency (EPA).

Local use as a soil conditioner of stabilized (digested) sludge by small farmers and local residents is considered to have limited potential for a partial use of the project's sludge. Much of the sludge from Study Area treatment plants is currently being used in this way. However, this means of disposal must be considered only supplemental since an uncertain market can be expected to purchase only a fraction of future sludge volumes.

Incineration in proper facilities can result in disposal with few air quality impacts. Generally, the water content of sludge is so high that it is not a valuable fuel and has no net energy recovery importance.

Landfilling, the most commonly used method of ultimate sludge disposal, requires a suitable site depending on the degree of dewatering of the sludge, and also requires sludge stabilization and a leachate control system. Drying sludge to less than 50% moisture content requires exorbitant amounts of energy; therefore, a Class II-I stie, which can accept sludge of 50 to 75% moisture content, is needed. Since several of these sites have been found in the Pittsburg-Antioch area, landfilling is considered an acceptable means for final sludge disposal for the North Shore subregional facility.

A review of the economics, engineering flexibility, and environmental safety of alternative sludge disposal methods resulted in the rejection of ocean disposal and

land spreading or soil conditioning as viable choices. Landfilling and possibly incineration were considered feasible for the North Shore facility subject to review of sites and the necessity of sludge digestion facilities as agreed upon by the EPA and state and regional boards.

Because land disposal systems in the East County were not considered to have good prospects for bringing in crop revenues, the ultimate fate of solids from these systems is not yet settled. At present, the following means of final sludge disposal are apparent from the Project Report:

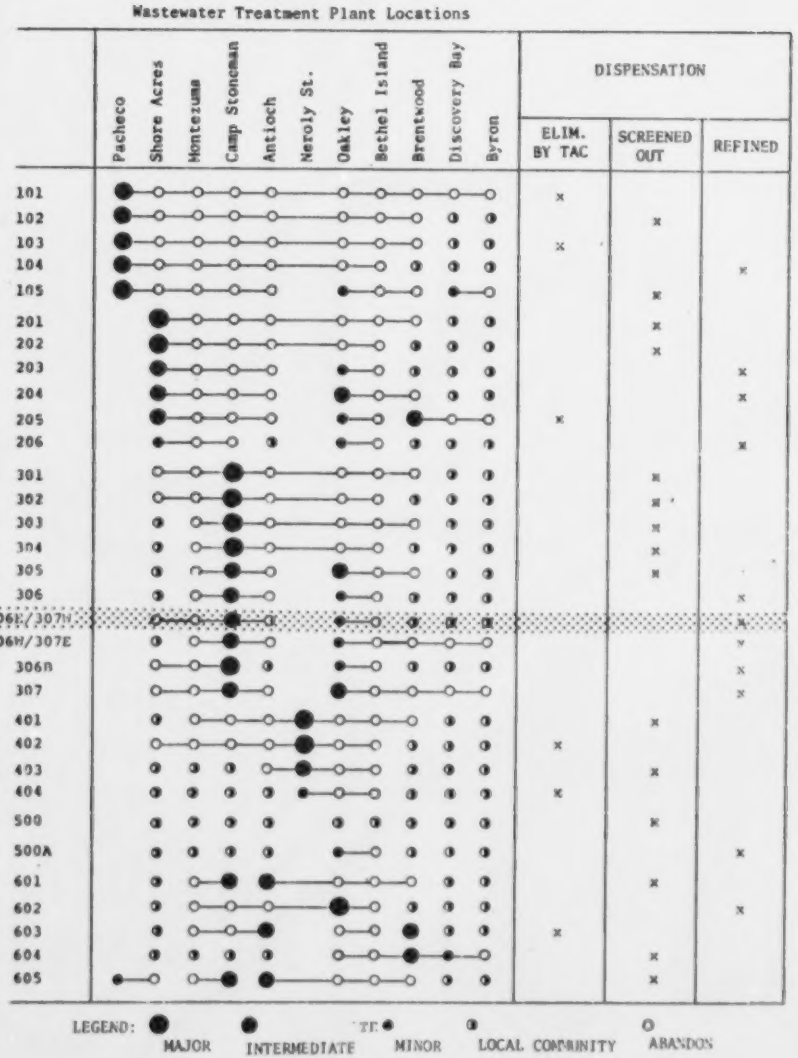
Oakley - accumulation of solids in bottoms of polishing (settling) ponds where they will undergo anaerobic digestion. Means of ultimate disposal of solids is not stated or shown in diagram.

Brentwood - solids will also accumulate and undergo digestion in settling ponds; however, sludge is diagrammed as being land-applied, perhaps as local soil conditioner.

Byron - accumulation and digestion of solids in bottoms of oxidation evaporation/percolation ponds; no ultimate disposal stated or diagrammed.

Discovery Bay - accumulation in bottoms of settling ponds with digestion. Ultimate solids disposal not stated or shown in diagram.

Table 2-5
ALTERNATIVES AND DISPENSATIONS



VIABLE PROJECT ALTERNATIVES

Throughout the course of water quality management study for the East/Central area, a variety of facilities configurations have been proposed which would incorporate varying degrees of consolidation and which would discharge at different points along the Sacramento-San Joaquin River system. In the most recent engineering and environmental study, thirty-two alternatives were considered, representing all of the elements of previous local or regional wastewater plans in various combinations. Table 1-5 summarizes the alternatives as set forth in the project report and illustrates their dispensation. Ultimately, eleven were selected for refined study and these are the subject of the detailed economic and environmental analysis presented in the EIS and the project report.

Summary Evaluation of Alternatives

Water Quality - Discharge to Surface Waters

The purpose of the East/Central Wastewater Management Project is mitigation of possible existing adverse water quality impacts on the Sacramento River System from municipal wastewater discharge. Two approaches are used - one, upgrading facilities to secondary sewage treatment levels, meeting State and Federal discharge requirements for this area; and second, relocating major discharges by plant consolidation and by use of land disposal east of Antioch. With respect to surface water quality, all alternatives meet the fundamental water quality objective of this program.

There are, however, clear differences in river characteristics along the Study Area.

Table 2-6

SUMMARY EVALUATION of ALTERNATIVES

IMPACT FACTOR	RESPONSE IN ALTERNATIVE SELECTION
1. Adverse growth allocation within Study Area	Favors those alternatives with local treatment where the absence of interceptor lines makes the shifting of sewage treatment capacity from one alternative to another impossible. Favored alternatives: 206, 306, 306B, 307W/306E, 500A.
2. Adverse corridor growth agricultural conversion	
3. Adverse transportation impacts, regional air quality degradation	Favors those alternatives permitting a high percentage of growth in the western part of the Study Area, where vehicle miles traveled (VMT) generation during possible commute trips to western employment centers is least. Alternatives favoring western growth (i.e., consolidated treatment at Shore Acres) encourage positive deviation from the DLUD. Favored 203, 204, 206, 306B. Alternatives allowing excess growth in East County either through consolidation within the East County or between the East County and North Shore permit negative deviation from the DLUD - thus greater VMT and regional air impacts. Low scores 104, 306W/307E, 602.
4. Adverse institutional political	The greater the degree of local treatment, the more highly favored since the easiest institutional arrangement with the least potential for political conflicts is complete autonomy of each local agency with respect to granting sewer permits. Favored 206, 306, 306B, 500A.
5. Adverse local air quality impacts	Favors those alternatives which may tend to concentrate development away from the Industrial Shore (Pittsburg-Antioch only) where the local air quality is now poor in comparison with other parts of the Study Area. Favored 104, 206, 306B, 307E/306W, 307, 602.
6. Adverse expansion flexibility	Favors alternatives where it is very difficult to further consolidate local districts with small local expenditure (i.e., short lengths of interceptor), thereby allowing future shifting of capacity from one district to another, and possibly more growth. Favored 204, 306W/307E, 307W/306E, 307. Low score 104, 500A, 602.
7. Beneficial reclamation reuse	Favors consolidation into large capacity plants (economies to scale favorable for special or supplemental treatment) for reclamation of effluent for agriculture or industry, or sludge processing. Favors alternatives with larger volumes of treatment capacity close to potential markets, especially agricultural areas. Favored 306W/307E, 307W/306E, 307, 602.

It is possible to compare alternative outfall locations and indicate relative preference based on the assimilative capacity of the river at each point. However, given the increased level of treatment, the limitations in water quality prediction and the uncertain future of river water quality itself, the magnitude of the observed differences is sufficiently small that they do not provide a clear basis for rejecting any alternative on water quality grounds alone. The following factors do provide a guide which must be weighed with other selection criteria:

Hydraulic capacity for dispersion and dilution increases further downstream as tidal flow increases. Favors (1) Pacheco, (2) Shore Acres, (3) Camp Stoneman, and (4) Antioch.

River flow is greater in the Sacramento below Chain Island than in the San Joaquin and the San Joaquin is occasionally subject to flow reversal due to water withdrawals. Favors Pacheco and Shore Acres over Antioch. Camp Stoneman is located in New York Slough at the confluence and is intermediate.

Downstream proximity to the Suisun Marsh and upstream to Delta slough sensitive areas raises potential adverse flood tide impacts from Pacheco and Antioch respectively.

Elimination of major surface water discharge favors Alternative 602.

Balancing these considerations, the Shore Acres outfall (203, 204) is preferred over the Camp Stoneman outfall (306, 307, 306W/307E, 307W/306E) although the difference is not expected to cause an observable change in water quality under most circumstances. Discharge at Antioch (500A) is not preferred, although the increased treatment level will assure water quality mitigation, and that alternative will be acceptable as well. Increased discharge at Pacheco (104) is not considered to have any clear merit relative to the Shore Acres outfall location.

Indirect Impacts

All project alternatives accommodate population growth in the Study Area as defined by the Design Land Use Distribution (DLUD). The project design criterion anticipates nearly a doubling of the present population by the year 2000. Inasmuch as all project alternatives are designed to serve the same degree of population growth allocated according to the DLUD, their basic impacts are the same.

However, each alternative may permit or even encourage deviation from the DLUD to a greater or lesser degree. An assessment may be made of each alternative based on the magnitude of deviation from the DLUD that it accommodates, and whether this deviation will result in fewer or greater adverse impacts than would arise from the DLUD itself. Analysis with respect to these criteria bears out the following general conclusions for each impact area:

Over all, those alternatives providing no consolidation of the East County with the Industrial Shore and locating major facilities centrally in areas of existing urbanization were judged more favorably. Local autonomy was considered important for conservative growth in the East/Central Study Area. For these reasons, Alternatives 203, 206, 306, 306B, 307W/306E, and 500A were favored.

The principal indirect environmental impact of the project stems from its Design Population. The most promising mitigation measures for growth accommodation are institutional constraints which would direct the utilization of project

capacity according to environmental and social planning objectives. In a tight framework of regional planning, all project alternatives would be restrained and the differences described above would become small. In the absence of such a framework, local direction offers the greatest practical restraint to adverse growth within the Study Area as a whole.

Port Costa and Mountain View

Two options were considered for the Mountain View Sanitary District service area. The first continued use of the existing treatment facility with upgrading and expansion as required; the second provided for the abandonment of the existing plant and conveyance of the wastewater to Pacheco.

The options considered for Port Costa include: (1) upgrade the existing facilities and discharge locally; (2) transport wastewater to the Martinez collection system for conveyance to and treatment at Pacheco; and (3) transport wastewater to a proposed facility in Crockett.

The alternatives for Mountain View and Port Costa which involved conveyance to other facilities, such as Pacheco, proved far too costly by comparison with local treatment and offered no environmental benefits. In the case of Mountain View, the present operation produces high quality effluent and the Marsh enhancement program is worth retention. In the case of Port Costa, the small volume of effluent and the high assimilative capacity of the river at the Carquinez Strait reduce discharge impacts to insignificance. In addition, the possible corridor growth stimulation of a conveyance system would have an adverse land use impact.

Basis for Selection of Proposed Project

After extensive review, the East/Central County Agency designated the alternative known as 307W/306E as the apparent best alternative. That alternative, described in Secton One of this report, Figure 1-2, was selected as the proposed project for the purpose of seeking Federal and State grant assistance to implement the wastewater management plan.

Selection was based on consideration of economic, environmental and engineering factors, as outlined in the table below.

Capital Costs
Operation and Maintenance
Environmental Impact
Social Impact
Scarce Resources
Flexibility and Reliability
Implementability
Compatibility
Bypass Analysis
Flood Protection
Land Use
Public Acceptability
Energy Needs

Comparison of such diverse factors is difficult since many important elements of decision making are not readily quantifiable. Environmental assessment and determination of social values are not sufficiently precise to allow a dollar cost to be attributed to project environmental impact. For example, the water quality analysis presented to the Agency, described in this report, clearly indicates a preference for an alternative discharging at Shore Acres rather than at Camp Stoneman; the cost differential between these alternatives is $5 million -- is the discharge preference worth $5 million? No technical answer can be given to that question.

Table 2-7

MONETARY COSTS OF MORE VIABLE ALTERNATIVES
(Dollars)

Alternative	Total Capital Cost	Average Annual Operation and Maintenance Costs	Total Present Worth	% Greater Than Least Cost Alternative
104	72,240,000	2,370,000	72,190,000	61
203	56,770,000	990,000	48,720,000	8.7
204	57,480,000	900,000	47,940,000	7.0
206	56,160,000	1,050,000	48,590,000	8.4
306	53,420,000	1,010,000	46,520,000	3.4
306B	53,980,000	1,020,000	46,820,000	4.5
307	5,740,000	850,000	46,240,000	3.2
306E/307W	51,590,000	930,000	44,810,000	0
306W/307E	57,660,000	930,000	47,830,000	6.7
500A	55,510,000	1,140,000	48,810,000	8.9
602	70,370,000	1,290,000	60,930,000	36

Table 2-8

MONETARY COSTS OF MORE VIABLE ALTERNATIVES FOR MT. VIEW SANITARY DISTRICT AND PORT COSTA
(Dollars)

Alternative	Total Capital Cost	Average Annual Operation and Maintenance Costs	Total Present Worth	% Greater Than Least Cost Alternative
Mt. View S.D.				
At Existing Site[1]	360,000	120,000	1,400,000	0
Convey and Treat at Pacheco	6,090,000	230,000	7,410,000	429
Port Costa				
At Existing Site[2]	140,000	4,000	140,000	0
Convey and Treat at Crockett	480,000	5,000	420,000	200
Convey and Treat at Pacheco	690,000	12,000	630,000	350

[1] Recommended minimum improvements to existing secondary treatment plant.
[2] New secondary treatment facilities.

In order to assist the immediate and practical problem of cost-effective water quality enhancement, the analysis of alternatives stated general principles of preference and identified groups of alternatives which were environmentally acceptable. Within the acceptable group, preference could be clearly shown for specific alternatives based on specific, isolated environmental concerns, yet *all* acceptable alternatives meet the fundamental objectives of the project and any one may be considered a reasonable choice by the Agency.

Given general environmental acceptability, cost becomes an important consideration. Not only is cost a burden for the local population and a drain on clean water grant funds, but cost savings on facilities allows further expenditure for environmental impact mitigation if necessary. In the example used above, the $5 million facilities cost differential between the Shore Acres and Camp Stoneman sites represents a level of expenditure that could be made for improvements at the Camp Stoneman site to advance water quality, while still preserving the cost-effectiveness of that alternative relative to the Shore Acres alternative. The improvements may include advanced water treatment, detention basins on an enlarged outfall; they may reduce the potential water quality impact at that location to a level preferable to the impact forecast for the other alternative. The next phase in project planning comprises specific design and feasibility assessment when decisions concerning the need and cost-effectiveness of such project refinements will be made.

Table 2-9

COMPARISON OF MORE VIABLE ALTERNATIVES

Rating Factor	Max. Points	MORE VIABLE ALTERNATIVES										
		104	203	204	206	306	306B	307	306E/ 307W	306W/ 307E	500A	602
Capital Costs	350	0	263	249	273	319	308	280	350	249	283	32
O & M	150	0	136	146	131	135	134	150	141	143	122	107
Environmental Impact	150	30	90	90	105	90	75	60	75	75	60	105
Social Impact	40	4	8	8	16	16	16	8	20	8	12	8
Scarce Resources	30	3	15	15	18	18	18	6	15	12	24	21
Flexibility & Reliability	50	10	25	20	35	35	35	25	35	30	45	25
Implementability	80	8	56	8	48	64	48	8	56	8	80	8
Compatibility	30	21	15	15	15	18	15	18	15	18	12	15
Bypass Analysis	10	5	7	7	8	8	8	6	7	6	9	5
Flood Protection	10	9	6	7	8	8	8	8	8	7	10	7
Land Use	10	3	5	4	6	6	6	4	6	4	7	4
Public Acceptability	50	5	30	25	30	35	35	20	40	25	40	15
Energy Needs	40	4	28	32	28	24	28	28	28	28	20	8
Total Score	1,000	102	684	626	721	776	734	621	796	613	724	360
Ranking		11	6	7	5	2	3	8	1	9	4	10

In order to indicate the overall comparison between the alternatives, the project engineer, the Technical Advisory Committee and the environmental consultant discussed numerical assessment for the factors listed above. The drawbacks of a numerical comparison system are obviously many, yet the foremost drawback, the inherent subjectivity of factor weighting, makes the exercise a valuable indicator of the trend in the decision making process. The results, presented in Table 2-9 , show the way alternatives were grouped according to general acceptability and the selection that resulted.

ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

DIRECT IMPACTS - CONSTRUCTION AND OPERATION

Water Quality

The principal motivation for the proposed project is water quality mitigation. The project will provide uniformly upgraded treatment reducing the quantity of biological oxygen demanding material (BOD) and suspended solids discharged into the Sacramento-San Joaquin River system by a factor of 3 or more from recent levels. The water quality objective of the project is to provide a cost effective reduction of the role of domestic wastes in the water quality problem of the San Francisco Bay-Delta system. Overall, the proposed project will achieve this objective. Nonetheless, there will continue to be a discharge of effluent materials, such as BOD, suspended solids, dissolved solids and nutrients, such as nitrogen and phosphorous. Growth in the Study Area population will increase the volume of sewage treated; increases in effluent volume will partially offset the increased level of treatment that the project provides.

The project planning period is from the present to the year 2000. Over the course of this period, activities, such as fresh water withdrawals, agricultural, industrial and municipal discharge, will continue and will act in concert to determine the region's water quality. In this context, the proposed project represents the expenditure of local, state and federal monies in the application of the best available technology toward fulfilling the East/Central areas obligation to participate in a regional water quality improvement effort. Although further improvements in municipal discharge are conceivable through advanced water treatment, land disposal or reclamation and reuse, the present application of these techniques is of limited feasibility for the majority of the project area's wastewater and their future implementation is reserved for the time when such additional clean-up measures are cost effective in a regional context.

Industrial Shore Subregional Facility

The proposed discharge at Camp Stoneman will comprise as much as 12.5 million gallons per day dry weather flow (MGD),containing as much as 3000 pounds each of BOD and suspended solids (30 mg/1). Less controlled quantities of nitrogen (10 mg/1) and phosphorous (5 mg/1) compounds, total dissolved solids (variable) will also be discharged. Wastes will be disinfected to a low coliform level and residual chlorine will be removed before discharge.

The outfall lies in New York Slough, a short, deep ship channel cutting between the Sacramento and San Joaquin Rivers along the North Shore of Pittsburg. Due to the hydraulic characteristics of the river at this point, the discharge into New York Slough will be rapidly mixed and diluted by the large volume of tidal and river flow. The discharge here will raise the concentration of typical river pollutants, such as BOD and nitrates, within the vicinity of several miles up and down stream by 5% or less under a wide range of conditions.

The location of this outfall, some 50 miles from the Pacific Ocean, means that a high proportion of effluent materials will be retained within the river system before ultimate degradation or elimination by tidal action or river flow. The overall effect of discharge of treated wastewater here will be to accumulate within the river a quantity equivalent to several days of discharge. This quantity, however, represents significantly less than 1% of the total amount of pollutants from other sources presently found in the water from the Sacramento to the Golden Gate. Due to upgraded treatment this will be less than the amount currently contributed by the present Study Area population's wastewater.

East County

The treatment and land disposal of sewage from Oakley, Bethel Island, Brentwood, Byron and Discovery Bay will be disposed on land by evaporation/percolation. The application is expected to have no significant effect on ground waters subject to present or near-term beneficial use. The percolation sites typically communicate directly to the surface aquifer and thence into the river system itself. Percolation will result in the accumulation of ions within the soil which may cause noticeable modification of soil properties and ground water quality over the course of decades.

Port Costa

Outside the contiguous East/Central Area, the small community of Port Costa will upgrade treatment and continue its discharge into the Carquinez Strait. Since the present discharge has no apparent adverse effect on this highly assimilative reach of the river, the future discharge of 55,000 gallons per day is not expected to have significant adverse effects.

Mountain View

Mountain View currently has a treatment level well exceeding permit standards. With continuation of the marsh enhancement effluent polishing system, the Mountain View discharge is expected to provide an effluent of high quality in the future and the discharge at the eastern end of the Carquinez Strait results in rapid dilution. Although the quantity of effluent will double over the project lifetime, the ultimate water quality effects on this reach of the river are expected to fall well within the objectives for the project.

Aquatic Ecology

The most deleterious and long-range effects upon aquatic ecosystems come from shifts in salinity and turbidity. These impacts would be the results of proposed future water resource projects involving alterations of the estuary's hydrology; municipal wastewater discharges would not bring about such basic changes.

The proposed project will result in a rapidly dispersed, relatively small amount of highly treated effluent throughout Study Area waters which have been receiving municipal waste of much poorer quality in the past. The discharge from Camp Stoneman will represent no degradation in estuary water quality relative to present waste qualities and ongoing industrial, agricultural and non-point-source pollution.

Because oxygen-demanding organics will be low in project discharge, dissolved oxygen levels should not change; striped bass, salmon, other fish and sediment-dwelling organisms should have more than adequate oxygen. Similarly, toxics such as heavy metals or pesticides will be at very low levels in secondary municipal effluent; sediment-dwelling organisms will continue to suffer only from existing bottom deposits, mostly near industrial sites or agricultural drains. Shellfish contamination with bacteria and viruses from domestic waste should not increase since projects discharge is highly improved bacteriologically over present municipal discharge in the area.

In general, the project effluent will contribute amounts of oxygen-demanding, sediment-altering, toxic and algae-stimulating materials to the river system, but in amounts so small in any one area, and insignificant compared to those amounts contributed by other sources, that the Camp Stoneman subregional facility discharge is not expected to bring about conditions harmful to aquatic ecology in the Sacramento-San Joaquin estuary.

Terrestrial Ecology

The direct disturbance of Study Area land during construction of the interceptor pipelines and facilities expansion will result in short-term and relatively minor impacts on terrestrial plant and animal communities. There will be few areas of native vegetation traversed by the pipeline route. All of the vegetation which will be disturbed during pipeline construction is the weedy or introduced vegetation characteristic of pasturelands and fallow fields, with the exception of a marsh-like area west of the City of Pittsburg. Once the pipeline has been constructed, these areas should rapidly return to their former vegetated conditions. The marsh itself is already subject to disturbance from an existing salvage operation and from the filling necessary for the future construction of a chemical plant. There should be little important ecologic disturbance of sites for sewage treatment plant construction itself, since all of the facilities are planned for sites where treatment facilities already exist. Therefore, the vegetation and wildlife of these sites is already much disturbed and the new construction will not create much further disturbance.

Cultural Resources

The Study Area is dotted with sites of cultural interest. Several dozen archaeological sites remaining from pre-settlement times have been uncovered in the course of land excavation for construction and cultivation, although no large scale survey of the area has been done. Post-settlement resources include one registered historical site and a large number of old buildings identified by local historical societies.

The proposed treatment facilities and pipelines do not affect any known sites. There is always the possibility of an accidental find during construction, however, although the likelihood is limited by the pipeline routing along previously disturbed rights-of-way. Nonetheless, an archaeological reconnaissance of the proposed route will be conducted during the next phase of project design. The result of that survey will guide the selection of alternative routes and mitigation measures.

Aesthetics

During the construction phase the activity involved with installation of the pipeline sections will be visible from roadways and some surrounding residences or other facilities. This will produce adverse visual impacts and some noise, but both these impacts will be short-lived. Once the pipeline is installed and the vegetation has recovered, the aesthetic impact will be negligible. The construction phase of treatment plants themselves will also produce an adverse aesthetic impact in the form of noise; nevertheless, the plants are not located in places where the increase in the noise level should have a nuisance effect on any residential population.

Adjoining land uses will be impacted both visually by the appearance of the treatment facilities and by the noise of operation. Nevertheless, all new facilities will be located either in industrial areas or in the immediate vicinity of an existing plant. Therefore, long-term aesthetic impact should not differ significantly from the aesthetic impact of existing facilities. The treatment plants will, in any case, have far less nuisance impact in these

regards than many large industrial installations.

There is also a serious potential public health impact in the event of a catastrophic plant malfunction; otherwise, facilities are expected to adequately contain, treat, and disinfect all materials. The proposed treatment facilities will have a large requirement for electrical energy; however, this requirement will be trivial by comparison with the energy needs of the community that the wastewater facilities will serve.

Financing

The fiscal impact of the proposed project are discussed in detail in the Project Report and in the Economics section of this report. Briefly, the overall project costs over the term of the project will be $40.5 million*, of which the major portion (76%) will be funded by federal and state grants upon approval. The local share first stage capital costs will be $9.8 million. Amortization of the facilities capital costs, in combination with on-going operation-maintenance costs, will incur an expense of $1.8 million annually, to be borne principally by the local population.

*1976 dollars

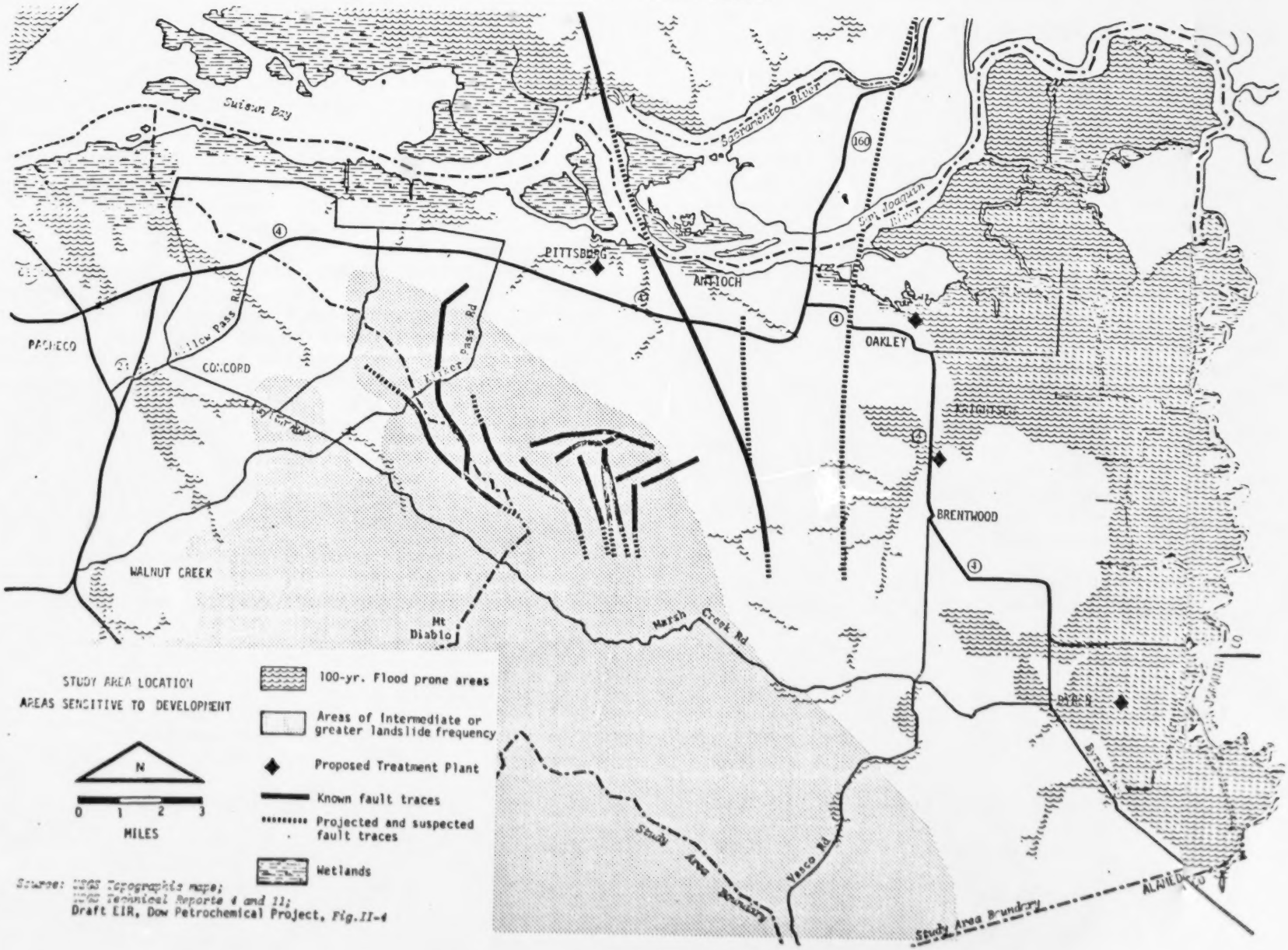
Sensitive Areas

Four types of areas which can be easily upset by human activity include marshlands, earthquake fault zones, unstable slopes, and flood-prone ares. As can be seen from Figure 6-23,none of the proposed plant sites will endanger or be endangered by unstable slopes. Appropriate protective measures and design precautions will be taken to compensate for the sites' location on 100-year flood prone areas (Camp Stoneman, Oakley, Byron) and near the Antioch fault trace (Camp Stoneman). These measures will include protection of the pipelines as well as the actual treatment plant sites. Marshlands in the vicinity of the plants and pipelines will suffer a minimal degree of temporary disturbance due to construction. Marsh areas are not anticipated to deteriorate due to long-term project operation, since project effluent will be highly treated, or due to secondary population expansion, since these marshy strips are located away from population centers.

Flood Hazards

As indicated above and in Figure 6-23, the sites for the Camp Stoneman, Oakley, and Byron treatment plants are to be located within areas predicted to be inundated by a 100-year flood. All plants, disposal sites and any accomodated population growth will be protected by appropriate levee construction, flood insurance, and on-going flood-plain planning.

Figure 6-23 STUDY AREA SENSITIVE AREAS



Sources: USGS Topographic maps;
USGS Technical Reports 4 and 11;
Draft EIR, Dow Petrochemical Project, Fig.II-4

INDIRECT IMPACTS - GROWTH ACCOMMODATION

Growth Inducing Impact Of The Proposed Action

The East/Central Contra Costa Wastewater Management Program is designed both to upgrade the existing level of wastewater treatment and to accommodate a certain amount of population growth in the Study Area. The project is planned in two stages for 1986 and 2000 populations. The first stage with projected increases in per capita wastewater generation rates accommodates a 40% average increase in the Study Area population with increases in individual service areas ranging from 19% in Sand Hill to 1025% at Discovery Bay. Stage I provides some increases in sewage treatment capacity for individual plants but in the Study Area, as a whole, the 1986 total design capacity is actually about 1.6 MGD lower than the apparent design capacity in 1975. This is not a significant difference, however, because much of the 1975 capacity is not actually usable at present since the plants in question are not meeting standards. The real difference is between the average dry weather flow in 1975 and the projected flow in 1986 of 3.67 MGD for which the proposed project will provide treatment meeting current effluent standards.

Stage II of the project which is scheduled to begin construction in various districts around 1985, requiring passage of separate bond issues, would increase capacity in the Study Area from the 1986 level of 10.84 MGD to a total of 14.9 MGD by the year 2000 and would thus provide for a total service area population increase of 85% over the 1975 level (29% above the 1986 level).

In providing upgraded treatment and increased capacity, the project is intended to serve both the existing Study Area population and the anticipated growth. The project has been planned in accordance with the best existing local and regional forecasts for growth, as well as present general plans and other growth shaping policies. In this way, sewage treatment facilities may be seen as part of a developing support structure for growth, and sewage treatment is certainly a necessary condition for growth in an urban area. Nevertheless, the presence of these facilities in the East/Central area and the treatment capacity they offer, in no way guarantees that this growth will occur.

The demographic analysis of the Study Area shows that growth in the East/Central area is probably not particularly sensitive to sewage treatment capacity. While the absence of treatment capacity is always de facto growth limiting, in the Study Area there is no "backlog" of committed growth awaiting sewer permits

Table 3-1 PHASED TREATMENT CAPACITY

	1975 flow (MGD)	1975 Design Capacity (MGD)	1986 flow (MGD)	2000 flow Design Capacity (MGD)
*East/Central Study Area	7.17	12.45	10.84	14.9
Mountain View	0.78	1.60	1.12	1.75
Port Costa	0.033	0.05	0.055	0.055

*Excluding Mountain View and Port Costa

for construction to commence. The growth boom of the last 10 years, which was associated with a short lived upturn in the housing industry, peaked around 1972 and then declined with the onset of the national recession. The conditions that prevail are not an incentive to the housing industry for further development, except in times where the nationwide economic conditions are highly favorable to new housing development at all income levels. It is difficult to predict future nationwide economic trends and likewise the housing industry future, however, there has developed a wide disparity between the income level at which the true housing need exists and the level at which it is provided.

The demand component of population growth is probably also constrained by employment growth in the Study Area which is already projected to lag behind growth in the local labor force. The present demographic characteristics imply that future immigration to the area will depend on the availability of local jobs, as the commuter is not a major market for East/Central housing. At present, the supply component of residential growth is limited by economic factors such as perceived market demand, the state of financing for the housing industry, and building costs, all of which are a function of general economic conditions.

The demographic analysis showed little change in the overall character of the area population between the U.S. Census in 1970 and the Contra Costa County Special Census in 1975. Both studies indicate that the East/Central population is less affluent in comparison with other more suburban parts of the County in terms of both housing values and income level of families and that the East/Central area has a strongly self-oriented economy for residence and employment. The lower land costs within the Study Area have reduced the price of new home offerings in the past, yet this economic advantage will probably not be sufficient to open up the East/Central area to Bayside oriented suburban development. Indeed the historically lower housing costs in the Study Area may not even be low enough to serve a purely local market, oriented toward local employment. Thus, there may develop a situation where housing supply is restrictive to the majority of the area's residents where demand is economically insufficient to stimulate major new construction.

Given these conditions, there is the possibility that growth in the Study Area will not occur even at the conservative rates projected for project design. In this case, Stage I treatment capacity provided will not be consumed by the year 1986 and it will be possible to postpone the start of Stage II for some districts until such time as growth in the area warranted additional facilities expansion. The purpose in project staging is to allow this future flexibility.

Commitment to either state of the project does incur a financial burden for the community that may in some senses be considered growth inducing. Since the major portion of the financial responsibility falls on Stage II, the approval of this stage and the passage of the appropriate bond issues will force the community to adopt a pro-growth attitude in order to spread their own fiscal burden. For the relatively low-income residents of the Study Area, the level of debt involved will only appear to be acceptable if borne jointly by a large population. Hence, the growth accommodation built into Stage II may become a self fulfilling prophecy. For this reason, it is imperative that Stage II be approved only in anticipation of growth that has already been demonstrated to be inevitable and not for reasons of speculation by private sector interests. Otherwise, if the speculation proved unsuccessful and growth did not occur, the existing socioeconomically depressed community would still have to bear the full facilities cost among themselves.

Stage I of the project, subject to immediate approval, also requires a level of financial commitment by the local population and provides for a moderate

amount of growth. Stage I does not have the same speculative or self-fulfilling prophecy aspect, however, since its primary impetus is the upgrading of existing treatment facilities to afford improved wastewater quality, it carries with it only half of the total local project cost, and it reserves the option to become the long-term solution to the region's wastewater management.

Land Use

Relative to its magnitude, the growth predicted for the Study Area, both project and non-project related, will have low impact generation. Nevertheless, it is impossible to nearly double the population of an area without causing some impacts on the Study Area itself.

The impact of the project accommodated growth is to promote the conversion of about 6200 acres of open land to urban use in the Study Area (5100 in the Industrial Shore and Bethel Island, and 1100 in the Agricultural Plain). Parallel unsewered growth in the service and control areas at a low density because of the septic tank requirement will convert an additional 4300 acres (400 acres on the Industrial Shore, 1600 on the Agricultural Plain and 2300 in the Foothills) for a total of over 10,000 acres. Of this total most of the 2700 acres in the Agricultural Plain will be prime agricultural land, about 6% of all prime lands in the East County and 18% of all lands now under intensive cultivation in the East County. (See Table 3-2)

The conversion of this much land represents a continued threat to the already marginal agricultural economy of East Contra Costa County, over and above the direct acreage converted. This threat stems from the general incompatibility between suburban residential and agricultural use of the land. Any significant urbanization juxtaposed with agriculture stimulates further urban growth by creating an appreciation of property values which turns continued farming of the land from marginal to completely inviable. Once the farmer can no longer afford to own his land, crop production on leased land becomes an interim land use. The only way the land owner can afford to hold land and charge a rent below its full carrying costs is in anticipation of a future sale at an even higher price. This is his only means of realizing a return on his investment.

Suburban development in close proximity to intensive agriculture also represents a nuisance to the growers. The impacts of the suburban population can cause crop damage; moreover, pesticides sprayed on the crops can be injurious to local residents. Construction impacts of suburban development as well as poor soil management by suburban residents can cause significant erosion of fragile delta and flood plain soils, making them less suitable for cultivation.

The growth accommodated by this project will probably not have the beneficial effect of restimulating the older urban core of Pittsburg and Antioch since the majority of growth is expected in suburban and rural areas. This suburban development at the periphery of the urban core and beyond may actually be at the expense of further decay of the older city. The existence of a long gravity interceptor is conducive to "leap frog" corridor development in both the Industrial Shore and in the Bethel Island and Oakley area, for example. Such "leap frog" development is highly land intensive since it is also disruptive to surrounding land uses. Moreover, corridor development has a high adverse aesthetic impact on the region.

Port Costa - Project Impact - Land Use

Although project design calls for a 68% increase in Port Costa's population by 2000, in numerical terms this amounts to only 170 persons or 60 DU (2.9 persons per household/1975 census). All of the service area growth will be sewered, and at the 1970 housing density of 4.0 DU/acre will convert only 15 acres of now open lands to urban use. On both a regional and a local scale this amount of land conversion is probably insignificant, even more so since it is phased over 25 years.

Mountain View

Design population growth in the Mountain View Service Area will result in the loss of 1050 acres of open lands to urban conversion by the year 2000 if growth occurs at present densities.

This is roughly equivalent to the existing area of residential urbanization, since design growth represents a doubling of the area's population. Most of the growth will be in the form of infilling development of fallow grazing lands of generally low productivity. This land does not constitute an important agricultural resource, but does have some aethestic value as visual open space.

Table 3-2

LAND USE CONVERSION - 1975-2000

	SEWERED			NON-SEWERED[3]			TOTAL
	Incremental DU	Density (DU/AC)[1]	Area Converted (ACRES)	Incremental DU	Density (DU/AC)	Area Converted (ACRES)	
Industrial Shore	18308	3.8	4818	394	1	394	5212
Agricultural Plain	3331	3.0	1110	1590	1	1590	2700
Bethel Island[2]	694	4.0	174	80	1	80	254
Foothills	0	-	-	441	0.2	2205	2205
East/Central Study Area	22333		6102	2505		4269	10371
Mountain View	3000	3.0	1000	50	1	50	1050

1) Based on interpolation of U.S.G.S. Land Use Data, 1970-72
2) Census Tract 3010
3) Includes unsewered portions of Service Areas and Control Areas
1 DU/AC is County standard for septic tanks

Growth in Environmentally Sensitive Areas

Several factors constitute environmental constraints to growth. Areas of landslide susceptability, earthquake fault zones, flood prone areas and wetlands are all undesireable for extensive urbanization. The area served by the proposed project includes very few unstable slopes or wetlands. There is generally sufficient flat land suitable for residential or industrial expansion that project accomodated growth need not occupy these sensitive areas. One fault zone runs through the City of Antioch, but does not include treatment plant sites. Large portions of the East County are below the 100-year flood line, resulting in requirements for plant protection and control of growth in accordance with National Flood Insurance policies. See Figs. 6-23 and 6-24 for locations of sensitive areas.

Demography

The proposed project sewage treatment capacities will accommodate an 85% increase in the East/Central sewered population and will increase the total proportion sewered. Project design growth rates applied to the total Study Area population (both sewer service and control areas) will yield an increase of nearly 74,000 persons (25,000 residential dwelling units) in 25 years, of which 66,500 (22,400 DU) are direct project accommodated sewered growth. (See 3-3, 3-4 tables below.)

Table 3-3

DESIGN POPULATION 1975 - 2000

	1975		Project Stage I 1975-1985		Project Stage II 1986-2000	
	Pop	DU	Pop	DU	Pop	DU
Sewered	72,200	24,800	109,720	37,400	143,230	48,600
Service Areas	79,700	27,400	114,300	38,900	147,750	50,200
Total (Service and Control Areas)	84,800	29,000	117,700	40,100	158,400	53,800

Table 3-4

INCREMENTAL CHANGE IN POPULATION

	Stage I		Stage II		Total	
	Pop	DU	Pop	DU	Pop	DU
Sewered*	+33,000	+11,100	+33,500	+11,300	+66,500	+22,400
Service Areas	+34,600	+11,700	+33,500	+11,300	+68,100	+23,000
Total (Service and Control Areas)	+36,200	+13,000	+37,500	+11,800	+73,700	+24,800

*The figures in this row reflect only project accommodated growth. That is, it has removed the component of existing unsewered population in the East County who will receive sewerage as part of this project.

The project proposes an increase in sewage treatment capacity designed to double the present average dry weather flow from 7.17 to 14.97 mgd. Of this increase, roughly 10% of the capacity will go to serve existing unsewered population in the East County (Sand Hill and Bethel Island). Of the total 5,200 units in the East County, 2,400 are now unsewered. The project would provide service to 1,700, or 70% of these residences. Over and above this, the project will directly accommodate 4,200 new units in the East County area, and 42,000 in the Industrial Shore.

At the present, the design capacity of all of these existing treatment facilities within the Study Area could accomodate an 84% increase in service area population, if all the design capacity were utilized and if the effluent were in compliance with water quality standards. This increase amounts to about 67,000 persons, or 20,300 residential dwelling units. Noncompliance with standards, however, limits the use of these facilities at present. Moreover, the Montezuma plant already has flow in excess of its design capability and is relying on accessory chemical treatment to maintain effluent quality. If the project were restricted to the utilization of existing design capacities, Camp Stoneman would have to intercept some of Montezuma's wastes, albeit at a high construction cost for the lines.

The secondary impacts of the project accommodated growth on the region will be roughly in proportion to the magnitude of the numerical increase itself. That is, the new population is expected to retain the same demographic character as the present population. The basis for this assertion is the fact that in the 5 years elapsed between the 1970 and 1975 census, it has been impossible to demonstrate a change in the overall demographic character of the area or to identify a new component moving in. The Study Area today has a locally oriented economy where most residents have local employment and fill the majority of their

commercial needs within the Study Area boundaries. Nearly all of the small proportion of out-commuting workers have employment inside Contra Costa County, particularly in the Walnut Creek-Concord-Martinez axis. There is no tendency for long distance work travel. The Study Area today has a per family VMT generation rate 25% higher than the Bay Area average, but 6% below the County average. Although the Study Area population is poorer than the Bay Region average, its VMT generation rate exceeds the Bay average because of its remote location and a population lifestyle with greater than expected reliance on the automobile.

Although population growth in the East/County Study Area is expected to follow growth in local employment, it is possible that the population growth through in-migration could be greater than the employment growth. Then the present disparity between local jobs and local work force will increase in the next quarter century. This would have two distinct effects: (1) a moderate increase in the number of out-commuting workers, most of whom will seek employment still within Contra Costa County; (2) a negative feedback effect on the rate of population growth by the near elimination of in-migration. Any increase in per capita VMT attributable to the modest increment in out-commutes should be at least partly mitigated by increase in locally available commercial services achieved through growth in the area's local serving employment. According to recent projections, local serving is expected to grow at a faster rate than basic over the period of this project.

If some unforseen stimulus to growth occurred, such as an extension of BART to Antioch and Pittsburg, then the new population most likely would be significantly wealthier than the existing residents. The new residents would have a lifestyle similar to the more wealthy Contra Costa communities and would hence generate greater per capita impacts. Therefore, if this stimulus occurred, the project accommodated growth could have an impact on regional VMT and air quality disproportionate to the numerical increase.

Economics

Economic stimulation from the sewage facilities construction and from the project accomodated growth will have both beneficial and adverse economic impacts on the Study Area. Beneficial effects include an increase in the local employment pool as part of the labor force requirement for construction and operation of projects. This will be temporary employment of several years duration during the construction phase for skilled and unskilled laborers and some professional personnel. The operation and maintenance crew will be largely skilled technicians. To the extent that materials required for project construction are manufactured or distributed locally there may be additional employment generated in manufacturing or distribution.

Beneficial economic impacts of project accommodated population growth include increased employment associated with substantial new home construction, greatly increased levels of commercial activities within the Study Area, and an increase in importance of the Sacramento/San Joaquin Delta as a recreational resource.

The chief adverse economic impacts of wastewater management facilities construction and accommodated population growth are increased cost which must be borne by the local population. The first stage (to 1986) local Share Amortization and O/M cost of $1.8 million annually represents an incremental annual cost of $24 per capita or $78 per DU to the present Study Area population. This is an average figure, higher in some areas and lower in others.

For poor residents, the imposition of the cost of project construction and operation may represent an undue hardship, particularly when the requirement for new treatment capacity is not to serve them, but to serve new population. In addition, State Revenue Program Guidelines can severely constrain the way in which costs may be spread and may thus prevent imposing costs on the basis of ability to pay.

Over and above the cost of the sewage treatment facilities themselves, the present population will have to finance the community utilities and services required by the new population in advance of its arrival. The foremost community services and facilities required by all of the population include school, fire protection, police protection, water supply, solid waste disposal, road maintenance, and, in some cases, flood control. The impact of new population in an area is always greater than the continuing impact of an existing population because inflation makes the cost of providing expansion of services ever increasing. For some parts of the Study Area, Antioch in particular, the new school facilities required will cost the local population more than the Wastewater Management Program.

Transportation

The population growth accomodated by the project will have an impact on local and regional transportation in proportion to the population increase itself. There is no indication that present VMT generation rates per capita will change appreciably over the next 25 years. The design population growth itself will acccount for at least a 65% increase in Study Area VMT. At present, the average VMT per family in the Study Area is 25% greater than the Bay Area average and 6% less than the Contra Costa County average. The Study Area rate is much less than some parts of the County,e.g.,the San Ramon Valley or other nearby areas such as Livermore, whose VMT generation rates are nearly double the Bay Area average. The difference in rates lies in the high proportion of the Study Area workers who are employed locally and in the very low proportion who work in the major urban centers of employment in the Bay Area.

It is most likely that growth in the Study Area will continue to be tied closely to growth in local employment. However, if future population growth is greater than the increase in local employment, then the estimates of future VMT generation rates and hence of concomitant air quality impacts given in this analysis will be exceeded. Because more of the new residents will be forced to commute out of the Study Area, the Study Area population would lose its present local orientation and gradually become a suburb of other employment centers.

However, with present transit and highway facilities it is unlikely that the Study Area would ever become a place of residence for a significant number of San Francisco or Alameda County workers. It is more likely that Study Area residents would find work in nearer employment centers within Contra Costa County. In this case, the Study Area VMT generation rates per family would still increase, but would continue to be less than the County average.

Given expanded transportation facilities, such as a BART extension to Antioch, it is possible that the Study Area would become a suburb of the major Bay Area employment centers, Oakland and San Francisco. Under these circumstances, the project would accommodate a new population with a lifestyle, and attendant impacts, more characteristic of such Contra Costa surburban areas as Walnut Creek or the San Ramon Valley. In this case, the combined effect of an affluent lifestyle and the Study Area's more remote location could drastically increase the VMT generation rates of its population. If the proportion of new residents who commute long distances should increase significantly, the per family VMT could rise to a rate greater than the County average.

Since the availability of a job is now the major motivation for a family to locate in the Study Area, the lack of jobs will lessen the desirability of the area as a place to live. If Study Area employment fails to grow, then the lack of new local jobs will most probably act as a deterrent to continued growth. If growth does not occur as expected, then the overall regional impact of Study Area generated VMT will become less by comparison to other areas which are experiencing faster growth.

Air Quality

Air quality degradation within urban air basins is a function of increase in VMT, mitigated by the effects of technological improvements in pollution control. In both the Study Area and the Bay Region as a whole, air quality consistently worsened through the 1960's as a result of steadily increasing VMT and resultant emissions. The effect of the technological improvements in emission controls (instituted by California in 1966) began to be felt in the early 1970's, and air quality has begun to improve. However, weather conditions will always have a major influence on the frequency of occurrence of days where pollution exceeds the National Ambient Air Quality Standards (NAAQS). The higher the proportion of warm, still days in any given year, the worse the ambient air quality and the greater the effects of local pollutant emissions which are concentrated under inversion layers.

Within the Study Area the Pittsburg-Antioch Plain has the poorest air quality because it has the greatest concentration of stationary sources (industrial) as well as VMT. It is also subject to imported air contamination, but, unlike the San Ramon or the Livermore-Amador Valleys, the topography (i.e. absence of basin bounding ridges on the east) does not favor retention of imported air. Thus the plain has somewhat better air than the surrounding valleys. The Pittsburg monitoring station has in the past five years averaged 20 days per year with high hour oxidant levels over the NAAQS whereas Concord has averaged 35 and Livermore 64. However, these data are in contrast to much better ventilated areas such as Richmond and San Francisco, which averaged 6 and 2 days respectively per year over the same period.

The impact of project accommodated growth on Study Area air quality will depend upon relative growth in stationary source emissions and VMT of the five criteria pollutants. Motor vehicles are the major source of reactive hydrocarbons and carbon monoxide. Highway vehicles and local industry contribute about equal amounts of nitrogen oxides, while industry is the major emitter of sulfur oxides. Suspended particulates emissions are attributable to both industry and agriculture (open burning, crop dusting etc.). One will recall that reactive hydrocarbons and nitrogen oxides are the major constituents of photochemical oxidants.

Reduction of the levels of photochemical oxidants now found in the San Francisco Bay AQMA demands a reduction in RHC emissions. Therefore, a decrease in the proportion of emissions contributed by vehicular travel, resulting in improvement of local air quality, is heavily dependent upon both a decline in the number of VMT and anticipated improvements in emissions control technology. If one uses the most optimistic appraisal of auto emission reductions coupled with the design population growth rate, the total air emissions are calculated to drop until they reach a low point around 1985. After this the effects of growth begin to outweigh the

effects of greater emissions control and contaminant levels are shown to rise once more through the year 2000. At this time heavy-duty vehicles (gasoline-powered trucks) will be the major source of nitrogen oxide and carbon monoxide. Automobiles, however, will still be the major source of reactive hydrocarbons.

Given the amount of growth accommodated by the project design capacity, the 2000 hydrocarbons will be reduced to 40% of 1975 emission levels. Future air emissions can turn out to be higher than this "optimal" situation if emissions control standards are not met, if growth is greater than planned, or if a higher than expected proportion of the growth is concentrated in remote portions of the Study Area.

The effect of this drop in emissions can be predicted by a statistical model, used to forecast air quality, known as the "Larsen" model. (See Chapter 6) The result of this analysis is a forecast that the Study Area air quality will be within the NAAQS after 1980 and continue to be through 2000. According to the model, it would take a further increase of 20% in total hydrocarbon emissions in the year 2000 to cause exceedance of the NAAQS at that time. Since all the increase is expected to come from mobile sources it would take a 125% increase over present day VMT to result in violation of standards. In this study it was calculated that VMT would only increase by 65% between now and 2000. This prediction makes the critical assumption that the level of emissions from stationary sources (i.e. industry) remains the same. Since the proportion from such sources should increase from 15% in 1975 to 35% by 2000, any change in the future emissions levels will have a significant impact on local air quality. Not only will the existing industries contribute a greater proportion of all North Shore air emissions, but new industrial growth is probable, given the encouragement of growth in the local labor force.

Energy

As of 1975, energy consumption by the residential population of the Study Area is approximately the same per dwelling unit as the Contra Costa County average with respect to the use of electricity and natural gas. (Liquid petroleum gas (LPG) which is widely used in the East County and Foothills was taken into account in the calculation of relative energy consumed as natural gas.) Gasoline consumption by the residential population (proportional to their travel) is 6% less per DU than the County average but 25% higher than the Bay Area average. Gasoline is the most important source of energy consumption by Study Area residents, and represents 54% of all energy consumed. The lower gasoline consumption compared to the County reflects the lower income level of the local population while the greater consumption in comparison with the region reflects the more remote location of the Study Area.

In the future, the new population accommodated by the project as well as the new population in the unsewered control areas will have requirements for energy per dwelling unit at least as great if not greater than the existing population. Energy consumption per dwelling unit is expected to increase among the incremental population since new units built throughout the Study Area will have a greater reliance upon electricity as the total source of domestic energy. Since it takes more energy to do the work of space heating, water heating, and cooking using electricity as opposed to gas, the proportional impact upon statewide energy supplies will increase. Nevertheless, because of the higher impact nature of newer development countywide, the Study Area will probably not surpass the county-wide average for per dwelling unit energy consumption by the year 2000.

SUMMARY OF UNAVOIDABLE ADVERSE IMPACTS MITIGATING MEASURES

SUMMARY OF UNAVOIDABLE ADVERSE IMPACTS/MITIGATING MEASURES

A summary of the unavoidable adverse impacts of the Proposed Project, as well as appropriate mitigating measures is presented in tabular form for ease of understanding. Impacts are organized under the general headings - water quality, land use, transportation, air and physical (archeology, ecology). Subsequent to the table there is an expanded discussion of certain key points concerning the rationale for and/or method of implementation of several mitigating measures.

Table 4-1 UNAVOIDABLE ADVERSE IMPACTS/MITIGATION MEASURES

CATEGORY	LIKELIHOOD	IMPACT MAGNITUDE	NATURE	SOURCE	MITIGATION MEASURES
WATER QUALITY					
Surface waters - outfall vicinity					
	Probable	Moderate	Increased biological oxygen demand Biostimulants	Normal effluent discharge	Advanced treatment Outfall modification
	Possible	Slight	Bacterial contamination of bottom dwelling species	Normal effluent discharge	Increased chlorination
	Possible	Slight	Chronic toxicity interference with aquatic species	Normal effluent discharge	Detention, advanced treatment
	Unlikely	Moderate	Bacterial contamination of water supply Acute toxicity to aquatic species	Plant failure	Detention facilities Operation safeguards
Surface waters - region					
	Probable	Slight	Increased concentration of biostimulants, BOD, minor toxic materials	Upstream tidal dispersion of discharge	Detention/ebbtide discharge
Groundwater	Probable	Moderate	Increased TDS, nitrates	Normal effluent discharge	Reduced percolation Advanced treatment
	Possible	Slight	Contamination of surface aquifer	Normal effluent discharge	Disposal modification Monitoring wells

UNAVOIDABLE ADVERSE IMPACTS/MITIGATION MEASURES

CATEGORY	LIKELIHOOD	IMPACT MAGNITUDE	NATURE	SOURCE	MITIGATION MEASURES
LAND USE					
Residential	Possible	Severe	Corridor growth - East County	Interceptor linking rural	Local treatment - no interceptor links
		Moderate	Corridor growth - Industrial Shore	Interceptor linking Shore cities, communities	Local treatment - no interceptor
	Probable	Moderate	Land Use Conversion 1975 - 2000		Public Agency Planning Controls
			Agricultural Plain - mostly prime lands		Protect Prime Soils
			Sewered growth - 1100 acres	Project accommodated growth 3300 DU	
			Unsewered growth - 1600 acres	Other growth 1600 DU	Zoning - Low density - agriculture compatible growth (20-40 acre zoning)
					Revise taxation structure, Williamson Act provisions
					Tightly drawn sewer service area boundaries
					Tightly drawn boundaries - all urban services
			Study Area		Restrict urban area
					Encourage infilling development
					Tightly drawn sewer service area boundaries
					Tightly drawn urban service area boundaries
			Sewered growth - 6100 acres	Project accommodated growth 22,400 DU	Zoning - higher density zoning in existing urban areas
					PUD zoning
					Cluster development
					Down zoning of urban fringe

UNAVOIDABLE ADVERSE IMPACTS/MITIGATION MEASURES

CATEGORY	LIKELIHOOD	IMPACT MAGNITUDE	NATURE	SOURCE	MITIGATION MEASURES
LAND USE cont.					
Commercial	Possible	Moderate to Severe	Unsewered growth - 4300 acres	Other growth 2,400 DU	Limit development in flood prone areas
			Increasing dependence of local population on outside commerical services	Changing demographic character (higher income)	Provide housing for only low to middle income families
				Population growth relatively greater than local-serving employment growth	Cater local commerce to local needs and incomes
					Accelerate growth in local-serving employment
					Make each communuty's services self-sufficient -
					Revitalize downtown Pittsburg and Antioch
TRANSPORTATION					
Employment	Possible	Severe	Higher VMT generation	Changing demographic character (higher income)	Discourage long distance commuting for local residents and establish local employment for local residents.
Employment	Possible	Severe	Increasing proportion of long-distance commutes	Socioeconomic job/housing imbalance (Residents out-commute, Workers in-commute)	Alteration of Study Area employment to restore job pool/ labor pool balance
					Public Agency Planning Controls
					Approve expansion of only those plants likely to provide employment for local residents
					Approve only those housing developments aimed at income level of Study Area employed residents.
					Discourage regional suburbanization of Study Area
					Reject all housing proposals intended to attract new community element of wealthy long-distance commuters
					Approve housing for lowest impact population growth in rural or remote areas

UNAVOIDABLE ADVERSE IMPACTS/MITIGATION MEASURES

CATEGORY	LIKELIHOOD	IMPACT MAGNITUDE	NATURE	SOURCE	MITIGATION MEASURES
TRANSPORTATION cont.					
Commerce	Possible	Severe	Increasing proportion of long-distance commutes	Little growth in local employment (basic)	Enhancement of non-vehicular travel More sidewalks, bike lanes Provision of extensive local transit Local transit districts Free company bus service to local resident workers
	Possible	Severe	Increased non-work travel out of Study Area	Little growth in local population serving employment	Accelerated growth in local population serving employment Careful balance of local vs. regional shopping facilities Local commerce catered to needs and income level of local residents Parking incentives or disincentives Metered lots at regional shopping centers Sliding scale of meter fees, favoring long-term parking Canceling parking meters Reduce available parking in neighborhood shopping areas Provide bicycle parking (locking attachments) Convenient local transit stops Sliding scale metered parking favoring long-term use Community self-sufficiency in commercial and other urban services Emphasis in rural areas

UNAVOIDABLE ADVERSE IMPACTS/MITIGATION MEASURES

CATEGORY	LIKELIHOOD	IMPACT MAGNITUDE	NATURE	SOURCE	MITIGATION MEASURES
AIR					
	Probable	Moderate	Further degradation of local air quality	Increased VMT due to 87% population increase	Transportation mitigation measures as above
					Improvement in vehicular emissions control technology
					Timely enforcement of increasingly restrictive standards for auto industry
				Increased stationary source emissions	Public Agency controls
					More stringent industrial emissions regulations
					Stiffer penalties for non-compliance
					Pollution tax based on level of daily emissions
					Tax credit for investment in pollution control research

UNAVOIDABLE ADVERSE IMPACTS/MITIGATION MEASURES

CATEGORY	LIKELIHOOD	IMPACT MAGNITUDE	NATURE	SOURCE	MITIGATION MEASURES
PHYSICAL					
Archeology	Possible	Moderate to Severe	Disruption or destruction of valuable sites along pipeline routes	Excavation and grading for pipeline construction	Thorough archaeological survey of pipeline routes at the time the exact routes are surveyed Excavation of archeologically valuable sites prior to pipeline construction Protection of identified sites by rerouting portions of routes which would disrupt these sites
Ecology	Certain	Minor	Destruction of plant and animal life common to disturbed areas	Construction of pipeline routes	Restoration of topsoil cover Reseeding

MITIGATION MEASURES

Water Quality

The project represents a cost-effective application of present technology to a regional water quality problem. Although further improvements in water quality depend more on coordination of intensive use policies concerning the Sacramento/San Joaquin River System than on municipal wastewater management *per se*, several mitigating measures may be applied to the project to enhance environmental protection.

Most significant would be provision for detention of treated effluent. Detention would allow selective discharge during high current and/or ebb tide which would reduce both local outfall impacts and the quantity of pollutants injected upstream in the San Joaquin Delta. Detention would provide buffering capacity in the event of plant malfunction, minimizing the need to discharge inadequately treated, disinfected or dechlorinated waste. The cost of a detention facility depends on its size and on the availability of open land. Preliminary estimates by the engineer indicate that detention for one day's effluent could be obtained at the eastern site alternative for the proposed Camp Stoneman plant. At a rough cost of several hundred thousand dollars, detention would be quite effective.

Advanced water treatment can be undertaken at some future time if indicated by environmental monitoring. Specific problems of nitrates, dissolved oxygen, etc. can be addressed by specific processes; costs vary accordingly.

Outfall design has not been specified at this stage of project planning. Several alternative configurations will achieve different degrees of initial dilution effluent plume shape and performance under variable tidal currents. Identification of outfall criteria in the next design phase can mitigate potential water quality impacts.

Outfall position may be varied while the sub-regional treatment facility remains at Camp Stoneman. Outfall extension across New York Slough and Browns or Winter Islands would cost approximately $15 million, and may not provide cost effective benefits by comparison to detention and/or advanced treatment.

Indirect Impacts

Project accommodated growth over the next quarter century is expected to retain the moderate impact character of the present population. The problems of devising mitigating measures for indirect impact is not one of trying to dramatically change the project or growth projected, rather it is to prevent the phenomenon that would change the moderate impact population to a high impact population.

The relationship between adverse environmental impacts and possible mitigating measures is presented in tabular form and expanded on below.

Public Agency Planning Controls

The Study Area is different from the rest of Contra Costa County in that it has a population which is largely internally oriented for both employment and commerce, and does not have a reservoir of "committed growth" awaiting sewer permits to commence. As this study shows, the rate of population growth in the area is most sensitive to the rate of growth in the local employment base rather than to the presence or absence of sewage treatment capacity.

The inward or local orientation of the population is not likely to change unless public or private sector decisions stimulate the introduction of a new demographic element. This could occur for example if the public sector and the community voted to extend the BART system from Concord to Antioch, and at the same time the private sector began (with public sector approval) to build housing designed to attract relatively more affluent, commuting families eastward from Concord or Walnut Creek. This might mean offering a "typical Walnut Creek" house at less cost in an Antioch location.

In the East/Central Study Area, public agency planning decisions have great potential to affect the magnitude, distribution and impact generation level of future growth. By taking steps to encourage the Study Area to keep its local economic orientation, public agency planning can mitigate many of the common impacts of project accommodated growth experienced in other places.

Traditional Planning Techniques

Tightly drawn boundaries for sewer service or other urban services.
Higher density zoning in existing urban areas
Planned unit zoning or cluster development
Down zoning urban fringe
Encourage infilling development

These planning measures all limit the consumption of open land by urban conversion and restrict urban sprawl. Although the boundaries of potential urban areas must be broadly defined for legal or political reasons, the actual zone of development may be confined by tightly defining the urban service boundaries within the urban zoned area. The most fruitful mitigation effort in the East/Central area is the implementation of conventional well accepted principles of urban and regional planning.

Employment Mitigation Measures

Encourage the establishment of local employment for local residents. This would reduce the necessity for long distance commuting, thereby decreasing regional transportation impacts.

In spite of its remote location, the Study Area has a relatively small regional transportation impact

because most of the work force has local employment, and the low to middle income residents meet their commercial needs locally. The Study Area is not a suburb of the central cities of the greater Bay Area, or even of the regional employment centers within Contra Costa County; only a small proportion of its total work force is employed there.

Because mass transit facilities are essentially a commute-mitigation measure, they are intended to serve commuters, to reduce the use of the private automobile on long distance commute trips. In a place such as the Study Area, where long distance commuting to concentrated employment centers does not presently exist, mass transit cannot fulfill its intended mitigation purpose, and in fact can have the effect of stimulating increased commuting among local residents. Transit may promote an influx of new residents with employment in Bay side cities drawn to the Study Area because of the existence of mass transit to aid their established long distance commuting.

Local Transit - Parking Incentives-Disincentives

Local, as opposed to regional, transit is a true mitigating measure. Local transit discourages use of the automobile locally, where it is most frequently used. Free company bus service to local employees, but not to employees of local industries or firms who reside outside the Study Area, will further encourage local workers to live nearby. A city or county subsidized local bus system with frequent service, low cost to the rider and many convenient stops promotes its use by residents for commercial, social or school transit. Such a bus system would be particularly effective when combined with a program of parking incentives and disincentives.

Limiting parking at neighborhood centers could promote the use of public or non-vehicular transport, especially if controls were likewise imposed on regional centers and if the local centers were at convenient walking or biking distance for most residents, and offered complete enough services and goods to meet the daily needs of the population (i.e., supermarkets, drug stores, laundries, etc.).

In order to discourage frequent trips, resulting in high "cold start" air emissions, commercial centers, regional or local, should encourage long term parking when parking is made available. Apart from attended parking lots, this may be achieved by setting parking meters with an expensive minimum time (50¢ for two hours). The meters must be self-canceling, setting the time back to zero (violation) each time a car leaves so that subsequent users must pay the full charge. Parking costs could encourage shoppers to use local transit instead of their cars, particularly if they could ride the bus for no charge.

Commercial Self-Sufficiency

Local commerce caters to needs and income level of local residents
Community self-sufficiency in commercial and other urban services, particularly in remote, rural areas.

Commercial self-sufficiency of communities drastically reduces the number of long distance commerce trips, and also provides local serving employment for local residents. The goods available must be of quality and price desired by the population that the facilities are intended to serve; otherwise, residents are still forced to travel. It is true that in order to make money, merchants must draw on a consumer pool of a particular size. It would be impossible for each tiny community to have complete regional shopping facilities. There can be a balance between adequate local facilities to supply daily or short-term needs, and centrally

located complete regional facilities to supply occasional or long-term needs. Public planning which recognizes this need and which does not exclude small commercial parcels from residential areas can help reach the needed balance.

Agricultural Area - Protection of Prime Soils

Zoning - Low Density Agriculture Compatible Growth (20-40 acre zoning)

A minimum parcel size of 20-40 acres is usually too low-density to encourage land speculation which inflates property values and makes farming inviable.

Revise Taxation Structure - Williamson Act Provisions

Reduction of the minimum parcel size for Williamson Act preserves from 100 to 10 acres and shortening the minimum contract period would probably make the tax reduction afforded by a Williamson Act contract a strong enough incentive for many prime land owners to enter Williamson Act preserves.

ENVIRONMENTAL ISSUES

Relationship Between Local Short Term Uses of Man's Environment and the Maintenance and Enhancement of Long Term Productivity

By providing significant improvement in the quality of the Study Area's wastewater, the proposed project is intended to maintain and enhance the environmental quality of the region. This enhancement is sought as a long-term benefit to the area to maintain or to improve the beneficial uses of the Sacramento River Estuary.

The effluent standard for the project is set forth in the NPDES Permit for the individual discharges within the East/Central Agency. These standards are determined by an assessment of receiving water quality and of wastewater engineering feasibility. They are not intended to be a final implementation of water quality objectives for this area, but represent the currently most cost effective mitigation approach available.

Furthermore, the relative contribution of municipal wastewater to the Sacramento River system water degradation is very small - on the order of 1% or less. The major input from non-point discharges such as agricultural runoff and the reduced assimilative capacity of the river caused by water diversions provide a context of existing water quality degradation that is not affected by this project at all.

Thus, the actual achievement of water quality objectives for this area goes beyond the implementation of current discharge requirements for municipal waste. The project is proposed as a necessary part of what must be a regional effort towards the maintenance and enhancement of the Bay-River system productivity.

The project facilities are designed to serve a population 85% larger than the present one by the year 2000. While the project does not directly induce this growth, it does accommodate such an increase in the sense that the provision of wastewater treatment is a necessary condition for the growth to occur. Population increase to this level would serve a number of short-term uses including a boost to local employment in the construction and maintenance of the facilities themselves and in the housing industry during the construction of residential units and the commercial and public facilities required to serve them. The private sector would benefit in the appreciation of some land values and land sales as well as in the sale of the units themselves. In some regards, the addition to the Area's housing stock may be considered a longer-term benefit. This level of growth may, in addition, provide some longer term economic boost to the currently depressed downtown areas of Pittsburg and Antioch. The magnitude of this boost will depend on the planning efforts to assist urban redevelopment in contrast to further development of suburban residential and commercial areas alone.

At the same time, project growth rates between now and 2000 throughout the East/Central area at the present housing densities would effect the conversion of an additional 6,100 acres of open land in the sewered areas and about 4,300 in the unsewered portions of the service areas and the control areas. Therefore, about 60% of the total acreage converted by an 87% increase in Study Area population is directly attributable to project service capacity. Growth which occurs in the unsewered areas will be roughly three times as consumptive of land as sewered growth since the minimum dwelling unit density is no more than one per acre. In terms of dwelling units the sewered growth accounts for nine times as many units as the non-sewered, but only 1.4 times the acreage converted.

The project accommodated land conversion would include about 1,100 acres of mostly prime lands in the Agricultural Plain, roughly 2% of all prime lands in the East County. Together with non-sewered growth at a lower density, growth to the year 2000 at projected rates will convert a total of 2,700 acres of farmland to urban use or 6% of all remaining prime lands.

Urban conversion of agricultural lands represents the elimination of the option to put the lands to some other use at a later time. Furthermore, the nature of urban development is such that the conversion of even a small portion of East County farmlands can have an additional adverse effect on the already marginal economy of most agriculture in the East County. Over and above the direct land conversion itself, this urbanization acts as a nuisance to adjacent farming operations and also stimulates an inflation in nearby agricultural land values which can turn farming them from marginal to completely inviable. Population growth at the rates projected by project design can in this way influence the long term productivity of significantly more than 6% of these prime lands by the year 2000.

If the projected design population levels for the year 2000 are not realized, the associated impacts will, of course, be less. Since population growth is a complex function of social and economic factors, it may not occur as rapidly as expected. With this understanding, the project has been formulated in two stages. The first runs from 1976 to around 1986 and provides for improvement in existing wastewater quality and sewage treatment capacity to accommodate a population increase of only 40%. It is the completion of Stage II of the project which would afford the planned capacities to accommodate the full 85% population increase in the service areas. Staging of the project does preserve the option for a future curtailment of new facilities construction if it were deemed either desirable or inevitable that the now projected growth beyond 1985 would not occur. The impact associated with a population increase of 31,000 in the Study Area is, of course, far less than for a 73,000 person increase and would preserve more options for future land use. The growth accommodated by Stage I would, for example, result in the urban conversion of only 3,100 acres in the Industrial Shore (2,500 sewered, 600 unsewered) and 700 acres in the Agricultural Plain (500 sewered, 200 unsewered). The staging of increments to sewage treatment capacity in the Study Area therefore preserves a larger number of future choices for the area and immediately forecloses fewer options than would a one-step project.

Non-foreclosure of future options also applies to the fiscal obligation to the community that the project represents. Most of the expenses for sewage treatment plant expansion and new conveyance facilities will be incurred after 1985 with the start of Stage II. The start of Stage II in 1985 requires the passage of a major bond issue in 1984 and the initiation of Stage II construction coincides with the maximum debt service burden to the community. In this manner, the existing population does not incur the obligation of the cost of the full project which would be tantamount to an advancement of the costs for facilities primarily designed to serve new population rather than to improve existing wastewater quality.

Conversely, growth may be greater than projected, in which event project treatment capacity would be consumed before the year 2000. Also, subsequent water quality programs may impose further discharge requirements on municipal wastewater. The proposed project does not foreclose the option of either a greater service level or

of advanced water treatment for this future time. The existing facilities at that time would have value as part of an expanded system with, however, a high incremental cost.

Irreversible and Irretrievable Commitments of Resources To The Proposed Action Should It Be Implemented

The project construction itself will consume the required amounts of steel, concrete and other building supplies as well as 20 additional acres of land for the treatment and disposal facilities and some 40 acres for the conveyance system right-of-way. All of the expansion of existing treatment facilities will be on or near the site where facilities already exist and, hence, will consume only a minimal amount of new land. The conveyance pipelines will require a narrow swath of land, generally along existing rights-of-way, extending between Shore Acres and Antioch in the Industrial Shore and between Bethel Island and Oakley in the East County. The vegetation will be disturbed on this land only during pipeline construction itself. The pipeline route does not traverse environmentally sensitive areas; pipeline construction will only destroy vegetation characteristic of disturbed areas which should quickly reestablish itself once the disturbance has ceased. Likewise, small numbers of wildlife will have their habitat destroyed and are likely to perish. These are all common species and are in no way unique to the pipeline routes themselves. The wetland area near the Camp Stoneman facility has been already subject to disturbance by a salvage and fill operation and there are current plans to construct a chemical plant. The impact of outfall pipeline construction through this area will not significantly add to these other sources of impact.

The most significant impacts of the proposed project are the water quality, land use and fiscal impacts which are derived from the construction and continuing operation of the wastewater program facilities rather than from the physical existence of the facilities themselves. Water quality impact depends on the magnitude of flow and could be reduced or reversed if the level of treatment were improved or if the level of service were curtailed. Project impacts on water are thus not irreversible.

The project does represent a short term commitment to a certain level of wastewater treatment and of service population. The ultimate sewered population would add about 70,000 persons in 24,000 dwelling units to the Study Area. The sewage treatment capacity provided by the project is part of the support structure which is necessary for this amount of growth to occur. To the extent that wastewater facilities are part of the overall growth accommodation of utilities and general planning, the project may be seen as part of an irreversible commitment of the East/Central area to residential development. The population growth which will be directly served by the project in turn represents the irreversible conversion of 6100 acres of open land to urban use, or 62% of the present acreage now given over to residential development. Of 6100 acres, 1100 will be prime agricultural acreage in the Agricultural Plain. The existing or potential agricultural productivity of this land may be viewed as a natural resource which is lost when the area is urbanized. Moreover, urban development of even a small portion of prime agricultural lands may eventually stimulate the conversion of still more lands where the agricultural economy is already marginal.

Urban development on the land itself represents the commitment of further natural resources in the form of construction materials, energy and human labor. To the degree to which this development provides local employment, its commitment of labor is seen as a benefit. The less expensive housing market of the Study Area means that fewer construction materials will be consumed here than for comparable population growth elsewhere in the County. The energy requirements of the new population will be roughly the same as the County average for electricity and natural gas. Their consumption of gasoline will be in proportion to their travel which in 1975 was 6% less per dwelling unit than the County but 25% greater than the Bay Area average. Project accommodated growth will therefore irreversibly commit a larger amount of growth in an "average" Bay Area location, but far less than growth accommodated in more typical suburban regions. The sewage treatment and conveyance facilities themselves will have an energy requirement but this demand will be small in comparison with the total regional energy consumption.

Although significantly assisted by both Federal and State grant programs, the project represents a financial commitment on the part of the local communities. Bond sales and subsequent construction make the capital costs associated with the project essentially an irreversible obligation for the community. The fact that the East/Central Wastewater Management Program is planned in two stages means that at the present time there is not an irreversible financial commitment to the second stage. The first stage Operations and Maintenance costs and bond payments will be the lowest in the Industrial Shore, or roughly $60 per dwelling unit annually, and the highest in the smaller communities of the Agricultural Plain, or roughly $100 - $200 per dwelling unit annually. The second stage costs are three to six times as great for some service areas but will be borne by up to twice the existing population. A commitment to Stage II facilities is thus a definite commitment to further growth in order to gain the increased assessed valuation afforded by new residential development which broadens the tax base and hence spreads the fiscal burden of the Wastewater Management Program.

The expenditure of federal and state monies is also a commitment of financial resources to this location. The sums allocated to Clean Water Grant Programs are limited; expenditure in the Study Area precludes application of those funds elsewhere. In this instance, the project seeks to fulfill important water quality objectives and the water quality improvement provided by the program is an effective use of Grant funds.

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